MAY 19, 1938 FIRST AERO WEEKLY IN THE WORLD REGD. AT THE G.P.O. AS A NEWSPAPER

FLIGHT

MAY 31 1938

The AIRCRAFT ENGINEER AND AIRSHIPS

1534
XXIII

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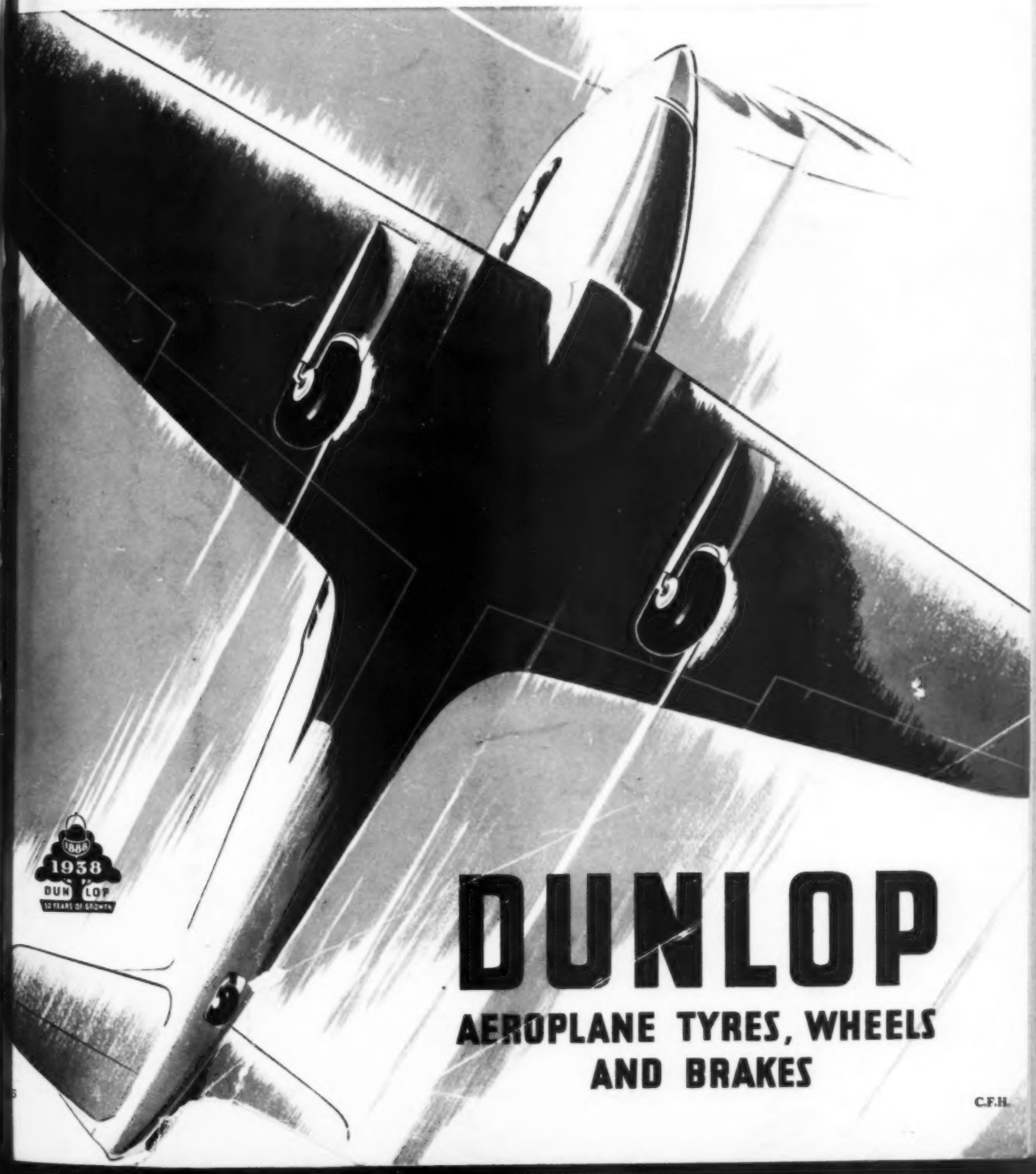

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The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

The New Appointments

WITH the appointment of Sir Kingsley Wood to the post of Secretary of State for Air there will be general satisfaction. At the Ministry of Health, and even more so as Postmaster-General, Sir Kingsley established a reputation as an organiser and as a man of vision. The improvements effected in his departments during his terms of office were marked and far-reaching, and it should be realised that it took considerable courage to decide on the "all first-class mail by air" in connection with the Empire air routes.

During his work as Postmaster-General Sir Kingsley Wood came into close contact with the civil side of aviation, and there is a certain poetic justice in the fact that one of his first tasks as Air Minister was to present yesterday the Air Navigation (Financial Provisions) Bill, which gives effect to the recommendations of the Cadman Committee Report.

With the Service side Sir Kingsley has had less contact, but his past record is such that the aviation community, and, indeed, the country, may well feel justified in expecting that any reorganisation which may be required will be carried out. *Flight* does not share the view that an inquiry is desirable, nor that a Ministry of Supply is needed. With a determined Air Minister at the top, a reorganisation of certain Air Ministry departments can be insisted upon, and if that is done there is reason to believe that it will achieve the desired end.

The new Under-Secretary of State for Air, Capt. H. H. Balfour, M.C., M.P., is well known in British aviation circles, having been connected with various companies in the industry and having served in the R.A.F. during the war, somewhat surprisingly in view of his youth (he is only forty now). He has thus practical personal experience not only of Service aviation but of civil aviation and of the aircraft industry. As an item of interest it may, perhaps, be recalled that during the war Harold Balfour, then a very young officer, wrote a series of articles for *Flight* in which he depicted, to use his own expression, "an ordinary day in the ordinary life of an ordinary pilot."

Straws

AMIDST the impressive figures announced in the Lords and Commons last week in connection with Expansion Scheme L, which captured the imagination, as, doubtless, they were meant to do, statements were made that were apt to be overlooked, or the significance of which was likely to be missed among the more spectacular announcements.

Lord Swinton, evidently realising that he and the Cabinet made a mistake in refusing to listen to some of the Cadman Committee's recommendations, foreshadowed in a vague sort of way a reorganisation of the Departments of Research and Supply. When asked by Lord Addison to be more explicit, Lord Swinton expressed surprise and said he thought it was quite simple.

"I said then," he said, "that I had always held the view that the better form of organisation would link research, development and supply under one head, and that I should myself have so constructed this organisation." And a little later: "I feel, therefore, that we are reaching a stage at which a change, which I have always regarded as theoretically sound, becomes administratively practicable and desirable, and I propose therefore to make that change in due course."

Amplifying his ideas for the benefit of Lord Addison, Lord Swinton continued: "Hitherto, in the organisation of the Ministry, supply on the one hand and research and development on the other have been under separate chiefs. I propose that when the details of placing these orders and so on are through and the immediate work of what I may call the Winterton Committee is finished, the orders to manufacturers shall rest with one officer responsible for design and production. The moment the machine is received from the factory it will pass under the officer responsible for organisation."

Let us hope that the new Air Minister will pursue and improve on that general idea.

Coming very late in a very long debate, a statement by Lord Winterton may have been missed. "I am glad to say," he said, "that a recent development in compressed

SIR KINGSLEY WOOD, our new Air Minister.

wood is being encouraged by the Department, and an order has been given to Messrs. Armstrong-Whitworth for a bomber to be made of this wooden substance." *Flight* has on many occasions expressed the view that certain types should be made of wood so as to speed-up production. One need not take the Noble Lord's words too literally. Mr. Lloyd would hardly build the entire bomber of compressed wood, but it is good news to learn that he is going to make use of it. When applied to fairly highly stressed parts, such as spar flanges, this material has considerable advantages, and may make the wooden aeroplane very little inferior to the all-metal one.

Political Broadside Fire

THERE was little evidence of *l'Effet Cazaux* in the broadside firing tactics employed in both Houses on Thursday of last week. Viscount Swinton and Earl Winterton did their level best to deflect the projectiles hurled at them by representatives of all parties, but even their greatest admirers can hardly claim that they were very successful. The tactics employed by the defence were perhaps at fault in that instead of dealing faithfully with the accusations of failure to secure production, the Government spokesmen tried to drag a very man-size red herring across the trail—a herring in the form of an announcement of an acceleration of the existing programme and a considerable expansion of the programme itself. Air Ministry critics were not slow in pouncing, and logically they had every reason to argue that if Scheme F was behind on production, Scheme L does not look like being any more successful.

Earl Winterton, in the House of Commons, denied that Scheme F was behind schedule, but had some difficulty in agreeing with Mr. Attlee and Mr. Winston Churchill as to what constituted first-line aircraft strength. He said that the scheme of 1,750 first-line aircraft with immediate reserves would be ready by March 31, 1939, and he hoped considerably earlier.

While one cannot claim that the Air Ministry defenders acquitted themselves very brilliantly, one may admit that they had a difficult time of it; and that, as Capt. Harold Balfour said, it is hardly fair to blame the Air Ministry for the fact that we have not to-day an air force on a parity with any air force in Europe. The blame for that, as *Flight* has pointed out repeatedly, must be laid at the doors of successive Governments, whose policies the Air Ministry had been carrying out.

Quick Results

AFTER last Thursday's debates there was little doubt that the almost universal dissatisfaction expressed would result in considerable changes in the Cabinet. Thus it came as no great surprise last Tuesday when it was announced that Lord Swinton had resigned from the post of Secretary of State for Air and that Sir Kingsley Wood had been appointed in his place.

During his term of office Lord Swinton has thrown himself heart and soul into his work. Only those who have come into close contact with him realise to the full how hard he has worked. All of us, however, can appreciate the difficulties which he has had to overcome, difficulties which might well have daunted a less energetic man. It would be ungrateful indeed were we to fail to give due credit to Lord Swinton for the energy with which he tackled the expansion programme, or rather the different expansion programmes.

Where Lord Swinton made his great mistake was in failing to appreciate that the Cadman Committee were on the right track, although it just failed to put its finger on the right spot when it went outside its terms of reference to express the view that R.A.F. officers as heads of the Research and Development and of Supply and Organisation Departments were illogical. Lord Swinton should have seen that although the Cadman Committee did not quite hit the nail on the head, what was wanted was a reorganisation of the Departments, not a change of their heads. Instead, he flatly refused to act on the Committee's recommendation in that direction. In saying this we are not forgetting that the decision was a Cabinet one, but we pay Lord Swinton the compliment of believing that had he insisted, the Cabinet would have followed his advice.

From a Parliamentary point of view, and quite irrespective of personalities, it is obviously an advantage to have the Air Minister in the House of Commons, particularly at a time like the present, when expenditure on the air force has reached astronomical figures.

No Roman Holiday

OVER-ORGANISATION is alleged by Service participants to be cramping the style of individual station commanders in the preparation of flying programmes for Empire Air Day. A tremendous amount of paper work has been done in the Air Ministry to ensure

CAPT. HAROLD BALFOUR, the new Under-Secretary for Air, has practical piloting experience, and served in the Royal Air Force during the War.

DIARY OF FORTHCOMING EVENTS—PAGE 500

wide distribution of aircraft throughout the country and it has been officially laid down that events are to be representative of the work of the station or unit concerned. Thus schools and similar establishments whose normal functions are not of a particularly spectacular character must rely to a great extent on visiting aircraft.

The determination of the Air Ministry to give everyone as good as show as possible led to some exacting demands on detached units, particularly aerobatic flights. One such flight was originally entered in the Scheme of Things to give eight displays during the afternoon, with cross-countries between stations to keep the pilots on their toes. Such an undertaking, of course, would have been quite superhuman and the schedule has been modified accordingly.

Last year's gruesome crop of tragedies has resulted in a general tightening-up of flying regulations for the Day. The more extensive use of modern monoplane equipment will automatically reduce the chances of accidents arising from aerobatic events and items calling for spinning.

The public must realise that Empire Air Day at Service aerodromes is no Roman holiday, but rather a great "at home" and that they are the guests of the Service.

Missing the Obvious

THE mission under Air Commodore J. G. Weir has gone to America and Canada to see if either or both of those countries could spare a few aeroplanes for poor old John Bull, who forgot to order them some years ago when he had plenty of opportunity.

A reader suggests in our Correspondence pages in this issue that we ought to ask Fritz Kcolhoven to build us some. (One wonder how Fokker has offended him.) The other day, in the *Daily Telegraph*, someone had just returned from Italy with the marvellous news that not only would Italy gladly help her very old friend with a lot of wooden aeroplanes, but she would even train British workmen to build them! She could do that because in Italy "aircraft production has reached saturation point."

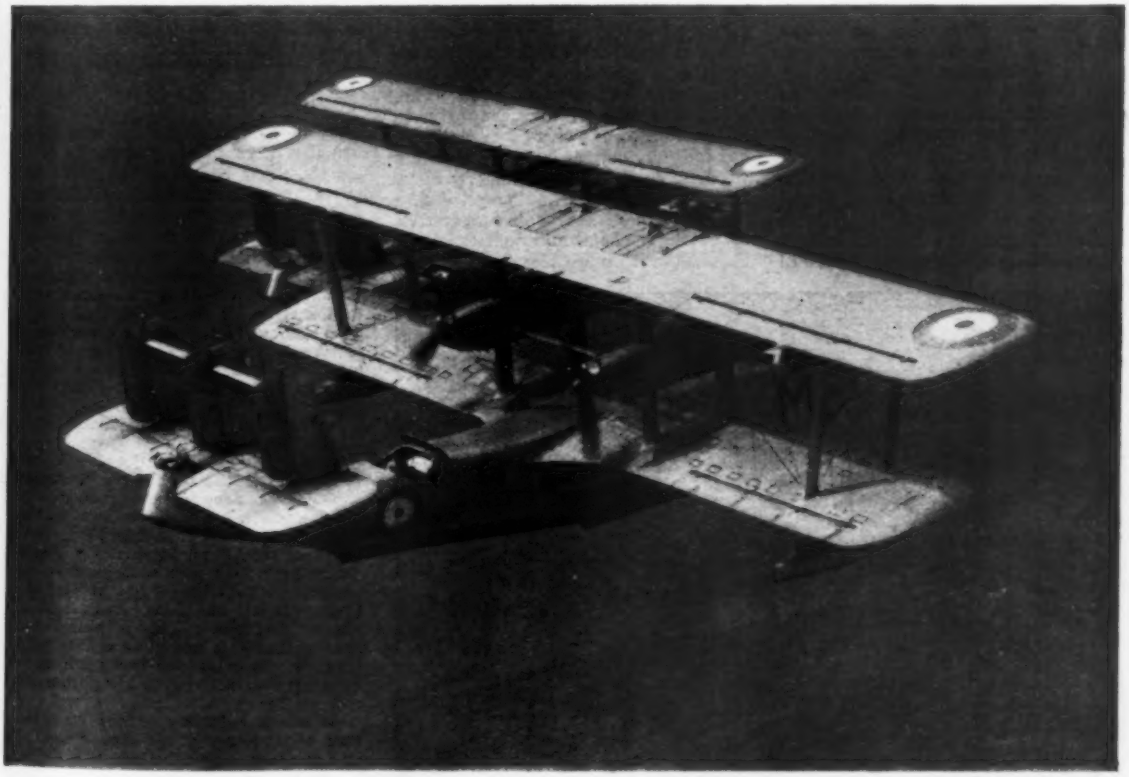
Flight, if we may say so, has always been to the fore in making helpful suggestions. We pleaded for a resumption of wood-cum-metal aeroplanes long before anyone else had realised that there was likely to be a hold-up in connection with all-metal aircraft. We pointed out that the Cadman Committee very nearly, but not quite, put its finger on the real trouble in the Air Ministry. At last the much-needed reorganisation seems likely to be carried out.

And now we humbly suggest that all these enthusiastic idealists have overlooked the most obvious solution of all our troubles. Germany's first-line strength and rate of production are always being rammed down our throats, with a fine disregard for £ s. d. (or its German equivalent). Very well, why not kill two birds with one stone? Why not buy all our extra aeroplanes from Germany? You see the beautiful simplicity of it? For every aeroplane we buy in Germany she will have one less, and we shall have real parity, or Lord Swinton's strength "adequate for our necessities," in no time at all. Columbus's egg again!

Vindication

WITH the full-load separation trials off Felixstowe last week the Short-Mayo composite aircraft principle may be said to have been proved from the technical aspects. Not only was the take-off accomplished in a very short time—about 17 seconds, in practically no wind—but the separation took place smoothly, with the two machines in perfect trim. The fuel-discharge tests were also entirely successful and at no time did the petrol tend to reach any part of the machine where there could be the slightest fire danger.

Technically there is now no reason why much higher wing loadings should not be adopted, and an even greater gain in cruising range and speed attained.



"Flight" photograph.

NOT ANOTHER "COMPOSITE"—just a pair of Short Singapore flying boats (two Kestrel VIII and two Kestrel IX) of No. 209 (General Reconnaissance) Squadron practising near Harwich for their Empire Air Day display. This picture was secured from the third machine in the echelon.

"Flight" photograph.

Looking down towards the Finnish section, which included two examples of locally designed and constructed trainers, one of them to be seen in the centre.

A general view of the Main Hall with the fighter in exhibit in the centre, dish stand

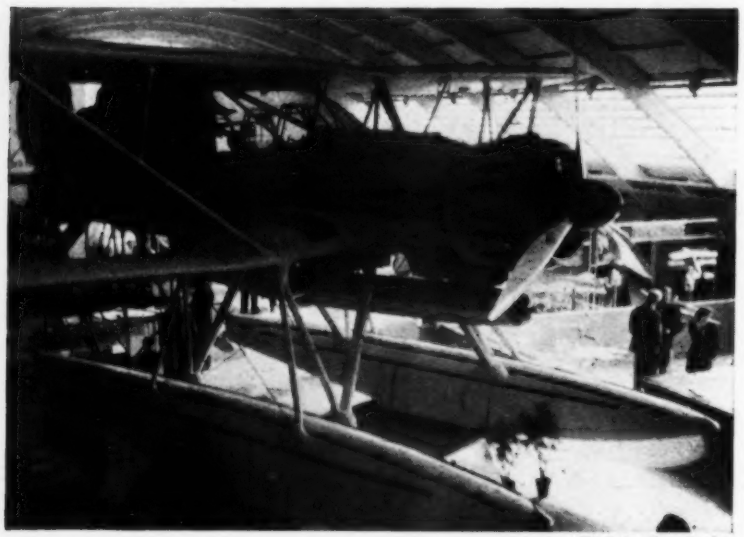
S.I.

This week's Aero Exhibition at Helsingfors of Finland's State Aircraft Fa... A Se... Ge...splay

SINCE Finland has always been a very good customer of ours in the matter of aircraft materials, it is a pity that the industry as a whole has not more thoroughly supported this week's exhibition at Helsingfors. Nevertheless, and remembering that there has been no concerted effort by the trade, we are quite well represented by individual firms. There are, however, no British machines on view, and only one machine (as such) has so far appeared for demonstration at Helsingfors Airport, the new terminal building at which was formally declared open last Sunday—the day after the opening of the exhibition itself.

On the other hand, the Germans have gone so far as to build themselves a special hall for their national display alongside the Fair Hall itself—a somewhat grandiloquent gesture of a kind which they have made before. At the end of the month this display will be taken, lock, stock and barrel, to Belgrade for the show there. Yet, as far as we know, Finland has never bought any appreciable amount of aircraft material from Germany. The national air line company, Aero O/Y, operate a couple of Junkers Ju.52's, and that about completes the total, but the German display is of an almost exclusively military character.

Let it be admitted that exhibitions in general provide little return for a quite considerable outlay in time, effort and money—that they are, in fact, a nuisance. This being the case, our industry should make up its mind whether to leave them entirely alone or to support them really well with a representative show of up-to-date material. In the meantime, Bristol, De Havilland, Dunlop, Hawker-Siddeley, Short and Mason, Smiths, and other firms, represented in groups by local agents, must be given full credit for taking the trouble to provide shows which will obviously benefit the whole trade almost as much (or as little) as it will benefit them individually.



"Flight" photograph.

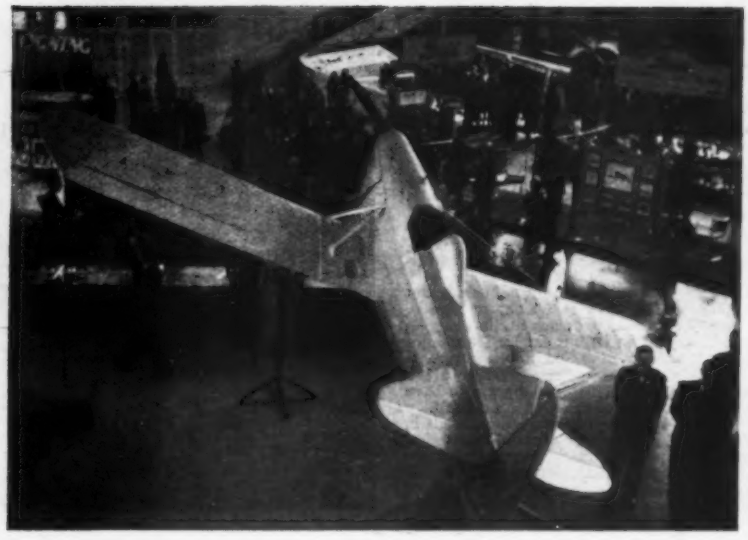
The big Arado 95 torpedo bomber floatplane in the German exhibition hall.

The Finnish International Aeronautical Exhibition (S.I.L.I.) is the second to be held in that country. The first was in 1929—before Finland had become of real importance as a customer for aircraft material. It has been organised by the Finnish League of Air Defence, and hence its correct (if unpronounceable) title: Suomen Ilmapuolustus - Liiton Ilmailunäyttely.

This is an era of national self-sufficiency, and the exhibition certainly shows that some of the countries in Europe which have always been looked upon as permanent customers for the products of specialised industries will presently need to import such products no longer. Finland herself has at Tampere (Tammerfors) the most up-to-date of aircraft factories. This is owned and run by the State and the exhibits show that the designers and craftsmen there have little or nothing to learn from the rest of the world.

After concentrating on the manufacture of machines under licence—and it is significant, remembering that timber is the country's primary product, that these machines have been almost exclusively of Fokker origin—the State factory is now designing and building its own machines. The first two of these

ith the fighter in the foreground, the Bristol engine
entre, lish stand in the background.



The Sparmann S.1 single-seater trainer monoplane in the Swedish section. The makers of this machine are now in the Svenska Aeroplan A.B. group.

ibitio elsingfors Described : The Work t Fa A Separate Building for the Ge play

have been training types, one (the Tuisku) for advanced military work and the other (the Viima) for primary and aerobatic training. An example of each is on show, the former fitted with a 215 h.p. Lynx and the latter with a 150 h.p. Siemens. Eventually, when the question of suitability has been finally decided, these engines—or others of a similar power—will probably be built under licence. At present the only engine to be built in Finland is the Bristol, for which the Tampella Company has the licence, and this firm exhibits a Mercury on its stand.

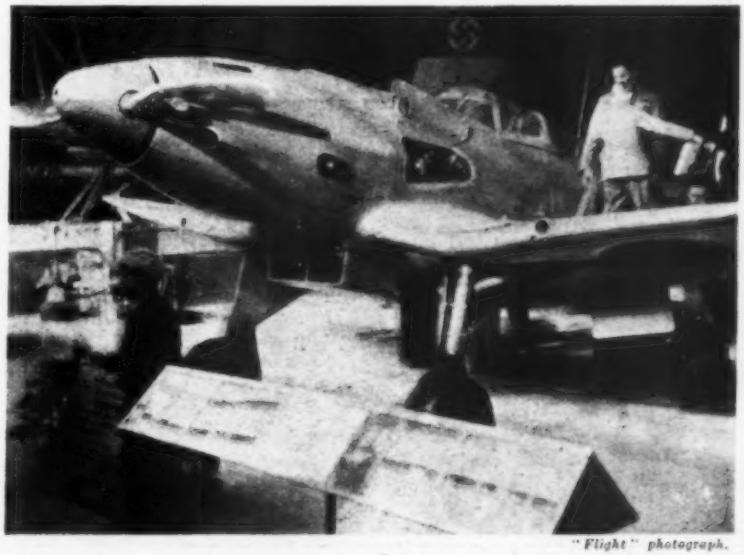
The State factory's outstanding exhibit is, however, a Fokker C.10 general-purpose biplane with a Bristol Pegasus engine. This machine is shown without its covering, so that both the structure and the equipment layout may be investigated. Incidentally, the factory's own types have, like the Fokker, welded steel fuselages and wooden wings, though the latter are fabric covered. Beside this C.10 is an example of a wooden spar for the Fokker D.21 fighter, which is also being built under licence. Very shortly the factory, which also has the most modern equipment for metal construction, will be starting on a batch of Bristol Blenheims with which the Finnish Air Force has recently equipped a couple of squadrons.

In the stands behind the aircraft exhibits are examples of the work, in both wood and metal, carried out at the factory, including airscrews in various stages of construction and such specialised winter equipment as streamlined skis and engine heater plant. A float designed for use with the Tuisku is also shown. These floats can be produced for about £200 the pair, so seaplane-minded owners might even turn to Finland for their equipment.

Other examples of Finnish self-sufficiency are the bombs and bomb gear by Tolfvan, and the sailplanes which provide mid-air decoration for the Hall, while suitably enthroned is Finland's first military aeroplane—a Morane Parasol on skis, which was the gift of a Swedish baron, von Rosen, in 1919.

Sweden is now, too, producing her own machines, though the works concerned do not appear to have reached the production stage for types other than trainers. A.B. Svenska Järnvägsverkstäderna (which might be freely translated as the Railway Construction Company) has been building Focke-Wulf Stieglitz trainers under licence, and has now obtained a licence from North American Aviation. Impressively arranged on the stand is the first all-metal stressed skin half-wing to be made in Sweden; this is complete with flaps and landing light. In due course, too, the Swedish Air Force will probably be issued with Northrops built under licence. The Swedish-built Stieglitz which is on show was flown over, and the finish is perfectly standard.

As an example of home design and construction, Svenska Aeroplan A.B. exhibit a single-seat P.1 monoplane with a Gipsy Major engine. This machine was previously known as the Sparmann, and the designer has joined the Trollhättan company. It is used for advanced training and is shown in standard form with a spatted wheel undercarriage, though it can, of course, be fitted with skis. The maximum speed is given as 160 m.p.h. and the landing speed as 53 m.p.h. Except for the way in which the base of the rudder follows the rear fuselage sec-



"Flight" photograph.

Close-up of a modern German fighter—the Heinkel 112 with wing cannon and fixed machine gun "hatch" open. Young Finland is just stepping off the port wing roof after a glance at the works.

tion and for the use of double spats (the inner one moving with the wheel and fairing the undercarriage more effectively in flight), there is nothing very exceptional about the machine.

A subsidiary to this firm has been building Bristol engines under licence for some years now and their output is about eighty a year. A Mercury VII is shown. Beside it is a Hamilton v.p. airscrew, for which a licence has been obtained, but it is not expected that these will be in production in Sweden before next year.

Among the details, A.B. Nordiska Armaturfabrikerna are getting down to the manufacture of various types of conventional aircraft instruments, and the Svenska A.B. Gasaccumulator exhibit a range of aerodrome lighting devices, one of which, a rotating searchlight beacon, performs on its tower in direct competition with a similar searchlight on a rather more ambitious erection put up by Allgemeine Elektricitäts Gesellschaft a few yards away. This firm appears to have been crowded out of the German section.

Quite a number of interesting, and in some cases new, items of equipment appear on the various British stands. For instance, Armstrong-Siddeley are showing an example of their two-speed supercharger with auxiliary drives and this show piece has, so to speak, its lid off for the first time. Previously the blower has been shown, but the cover for the gear mechanism has been sealed in position. This mechanism is of a fairly simple and straightforward epicyclic type giving, in the case of the Tiger VIII, ratios of six and ten to one. The remote control for the ratio change is hydraulic. On this stand, too, is a cowled Cheetah X with v.p. airscrew hub, and an uncowled Tiger VIII.

Engines and Airscrews

Working models never fail to attract attention and the sectioned example of the Bristol Pegasus XX, complete with realistic explosions and full working sequence, was, on the first two days of the exhibition at least, invisible behind a dense mob. A type which has not yet been seen in service outside this country, the sleeve-valve Perseus, is also shown and manual explanations of sleeve-valve operations can be watched minute by minute.

The new exhibition scheme devised by De Havillands makes their stand quite one of the most presentable in the exhibition. Both Gipsy Six and Gipsy Major engines are mounted on simple chromium supports and the rich red crankcase finish causes these engines to stand well out from their surroundings. The Gipsy Six Series II which is on show has a constant speed governor as well as provision for a generator drive and Breeze ignition harness.

A range of controllable pitch airscrews of the 5,000, 4,000 and 1,000 sizes are separately shown together with sections of the hub and constant speed unit—the former with the new quickly detachable spinner—and the whole stand is both simple and effective with its grey, red and black colour scheme. Mr. Buckingham had also brought over one of the 1938 89A's which he later demonstrated at the airport opening. Incidentally, the Finnish operating company, Aero O.Y., have just taken delivery of a second example of the machine for use on their internal services and this 89 arrived, with its Finnish crew, a day before the demonstrator.

"*Flight*" photograph.

The attractively simple D.H. stand with a *Flight* photograph of the Albatross as the central background motif.

On the Smith's Aircraft Instruments stand was something quite new in the way of instrument panel layout. Generally speaking, this panel is just as it might be fitted in a transport or bomber, only one or two instruments, such as oxygen pressure gauges and duplicated undercarriage and flap indicators, making the panel obviously a show piece. The main theme is a standard Service blind-flying panel fitted, in this case, with the new Smith artificial horizon and gyro which are now in full production. All the instruments in the panel are flush mounted and properly matched, and the only criticism which can be made concerns the size of the boost gauges, which are rather too small for modern engine operation conditions. Mr. Samuelson has also brought along the "showroom" Dragon, though this, of course, remains out at the airport. In addition to the equipment with which it was originally fitted the machine now carries one of the new Standard R.9 D/F receivers with a wave-range of 250 to 2,000 metres and an enclosed loop only four inches in diameter. The automatic pilot has been improved in several respects and there is now an automatic cut-out which can be set to throw the pilot out of gear if the machine's attitude exceeds any set angle in any axis. There is also a remote directional control which can be used by a bomb aimer elsewhere in the machine so that he can, for a period, control the pilot himself. Just before the Show opening Mr. Auping arrived with the Standard Radio Phœnix.

Short and Mason show a fairly normal range of aircraft and scientific instruments with one of the new miniature instrument panels which this firm has developed for use on ultra-light machines. Their idea eventually is to produce aircraft instruments which, while being reliable and accurate, are not much more expensive than those to be found in cars.

Tyre Stresses

Examples of wheels with the new quickly detachable rims are to be seen on the Dunlop stand. In this type the rim on one side is a separate unit held in place by a strong coil-spring circlip which settles in a groove; the tyre is slid straight on to the well and the rim then pushed on and secured. In aircraft tyres most of the vertical stresses are converted into lateral ones at the tyre beading and the new rim will permit the use of much heavier and stronger beading so that as much as twice the present load may eventually be carried by the same sized tyre. Pneumatic gear for operating wheel brakes, camera gun and landing light are also laid out on this stand, together with the conductivity demonstration arrangement for the Ecta tyre.

Elsewhere, British interests are represented by local firms except in the case of Imperial Airways, who have a stand in the gallery. Aero Consulting, Ltd., for instance, are showing Palmer tyre and brake equipment as well as Rotax and Hobson components, Stream-Line filters and Superflexit piping.

As one of Finland's more important aircraft suppliers it is natural that Fokkers should put on a very good display, with one of the Finnish Air Force D-21 single-seat fighters, in this case fitted with a Bristol Mercury and Ratier airscrew, as well as a series of separate stands dealing with constructional methods, the new Consolidated agency, the Douglas D.C.2s, 3s and 4s, and the T8W, a twin-engined float-plane designed for coastal defence, reconnaissance or torpedo bombing. Additionally, a range of models were shown giving a visual picture of Fokker development from the very first monoplane to the latest military and civil types. The Fokker D.21 has, with a Mer-

The Dunlop-Smiths corner with Mr. and Mrs. Samuelson and Mr. Auping as the central figures of human interest

ury VIII engine, a maximum speed of more han 270 m.p.h., and carries various types of rmament which can, in the modern Conental manner, include two cannons. Some-hing like 250 Consolidated boats have been old in America, so it must be a remarkable achine; the standard model has, in fact, range of 4,200 miles with a full crew of even and the necessary armament. A par-icularly interesting item in the construc-ional exhibit is a built-up spar which is ade with both dihedral and back-sweep. The method of carrying out the apparently mpossible shaping operation involved is, in act, simple and ingenious. The built-up par is made first with a plain dihedral and he member is then planed down diagonally o produce the necessary double kink. In rder to save unnecessary wastage of expen-ive spruce, the major part of the sections o be planed down are built up of fir.

Lightweights

Quite recently Fenno-Avia have obtained he Finnish agency for the Czechoslovakian Zlin XII and the company hopes to sell everal of them for private and club flying. This machine is a low-wing cantilever mono-plane which, with a Persy II engine of 45 h.p., carries two tandem-seated occupants at a cruising speed of about 95 m.p.h. The engine, which is also made by Zlinska Letecka, is a flat-four with at least a super-ficial resemblance to the well-known Con-tinental. Other Czechoslovakian exhibits include a well-used example (the machine was actually flown out) of the Beta Minor, which is also a fairly low-powered tandem two-seater, and a range of Walter and Praga engines, the largest being the Walter Super Castor, a radial of 450 h.p., and the most interesting an o.h.v. flat-four Praga.

Quite near to the Czechoslovakian section, and showing up the Beta Minor not too well in the matter of general finish, is the Lat-vian V.E.F. monoplane which has already been seen in this country. The finish of this machine, in spite of the fact that it was also flown over from Latvia before being brought to the Show, is really extraordinarily good. Out of sight and rather out of mind on the same stand is cinematograph and radio ap-paratus which, curiously enough, are the manufacturing firm's prime interest.

The most powerful engine in the show is the Gnome Rhone 18.P, which is a twin-row radial giving 1,650 h.p. for take-off. It appears that this engine, which has been passing through a rather lengthy develop-ment period, is now ready for serious produc-tion. If that is so then this particular unit will be the most powerful to be obtained.

The German Hall is dominated by an Arado 95 seaplane which somewhat over-shadows the bulk of the exhibits. This machine, which is what we should call a torpedo spotter reconnaissance type, is shown complete with torpedo and bomb load. In general layout it may be described as being similar to the Blackburn Shark and is powered with an 880 h.p. B.M.W. radial and Junkers-Hamilton airscrew. Its outstanding features of interest are its mas-sive float undercarriage, its sponson-like lower centre section (which is part of the fuselage), and its typically Arado tail design with a one-piece elevator lying well aft of the rudder, the hinge of which is approximately level with the leading edge of the tailplane. Apparently the company hopes to sell one or more of these to the Finnish Government for coastguard service.

The only other complete machine in the Hall is a Heinkel 112 single-seater fighter with a Junkers Jumo 210 Ea. petrol motor giving 685 h.p. Contrary to general ideas, the Heinkel is a comparatively small machine comparable, one supposes, with our own Spitfire, and even indoors it does not appear to be large. In its Show form the Heinkel carried two 20 mm. cannons in the wing and two fixed machine guns in the fuselage. In spite of its comparatively small dimensions the cockpit is so tidily arranged that it does not give an impression of being in any way cramped. The official maximum speed is something rather more than 300 m.p.h.

Other German machines were exhibited in model form and a very magnificent series of these were on view in various stands. Among them was a model of the Arado 96 high-speed general purpose trainer, of the Focke-Wulf Condor—which, in full scale form, appears to have suffered some vibra-tory troubles with the engine mountings—and of the Ju. 90 which, since the struc-tural failure during vibration testing experi-ments some months ago, is now being fitted, it seems, with Bramo Fafnir engines.

Engines

Full-scale engine exhibits include an ex-ample of the Mercedes Benz DB 600 1,000 h.p. engine which, when fitted to the Mes-serschmitt "special," broke the landplane speed record last year. It is certainly an extraordinarily clean inverted vee-twelve though whether this cleanness has been ob-tained at some slight sacrifice in accessibil-ity is another matter. The Argus inverted vee-eight engine is shown in two forms, one of which is designed for high altitude operation. Not many people realise that this company also manufactures successful air-craft brakes of the disc type which is some-what discredited in this country because of its original tendency to retain the heat gener-ated during heavy usage. Another big engine of military interest is the Junkers Jumo 210 petrol engine which is shown along-side the rather better-known diesel Jumo. The B.M.W. Hornet, which has been fitted to the majority of the enormous number of Ju. 52s manufactured during the last six or seven years, is shown in a Ju. 86 cowling.

Extremes in engine size from the same makers are the Bramo Sh. 14 A4, a seven-cylinder radial of 160 h.p., and the com-paratively new Bramo Fafnir nine-cylinder radial, which has a maximum output of 1,000 h.p. at 2,500 r.p.m. The smallest class is represented by the Hirth range of in-line four cylinders and this firm now produces an inverted vee-eight of 280 h.p. which is also shown.

Needless to say, the range of scientific and flying instruments, camera guns, telescopic sights and the like is as extensive as the various items are magnificently made and finished. The Germans have, after all, held an undisputed lead in this type of work for a great many years. To the initiated the Deutsche Versuchsanstalt Fur Luftfahrt and the Askania-Werke stands are among the most interesting in the entire exhibition. The former may be considered as a section of the German Farnborough and the items in the display included various types of test-ing devices.

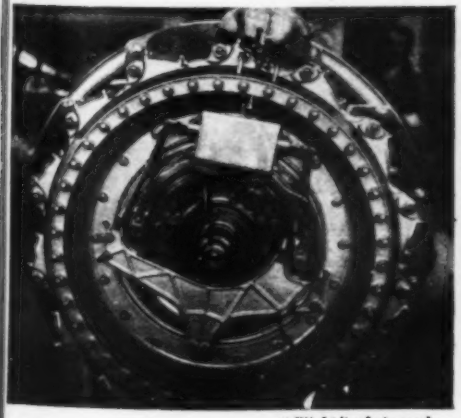
Instrumental

The Askania exhibits include the latest version of their distant-reading compass with course-setter and indicator. This type of equipment is in very considerable use in Germany and has certain quite definite navi-gational advantages. The difficulty in this case seems to be to produce a compass mounting which will give this somewhat delicate instrument a useful life in rough conditions. At long last a firm has produced a special instrument panel for the sailplane pilot. For modern soaring work it is neces-sary to have a rate-of-climb indicator, a good compass and a turn indicator, and the days when a pilot needs to put up with odd bits of equipment are over—at least in Germany. The Askania sailplane panel has its six miniature instruments neatly mounted in the smallest possible area and the largest and most carefully made of the series is the always important vertical velocity indicator, which has the central position in the panel. The little vertical compass is itself quite a remarkable piece of work.

While the Show itself is well organised and planned and the exhibitors provide a very representative display, there were one or two slips in the organisation outside. For some reason or other, for instance, the banquet concerned with the exhibition had been planned for a comparatively small attend-ance of representatives. These plans were modified at the last minute and most of the British representatives received their invita-tions, in some cases verbally, on the after-noon of the very day on which the banquet was being held. As a result quite a number of English visitors who had little or nothing to do with the S.I.L.I. itself, but who had received their invitations some days before, were present, but the trade contingent was conspicuous by its absence.

Rather similar in many ways was the situation after the airport opening on the following day, when groups of foreign visi-tors found that they were left at the airport with no mechanical means of conveyance over the twelve kilometres to the centre of the city. Some of them started to walk, thought better of it, and engaged Finnish-speaking interpreters to obtain taxis.

None of which is to deny the extent of the hospitality afforded the visitors in the ordinary course of events.



"Flight" photograph.

Seen uncovered for the first time—the Armstrong-Siddeley Two-stage blower epicyclic gear with the Short and Mason instrumental exhibit on the right.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

M. GABRIEL VOISIN, one of the pioneers of the aviation industry, has recently been appointed a Commander of the French Legion of Honour.

Twelve entries had been received by Tuesday last for the Manx Air Races. The closing date is 6 p.m. on Saturday, May 21.

It is understood that the U.S. Government has definitely refused to supply Helium to the German Zeppelin Company.

Three Boeing YB-17 "Flying Fortress" bombers of the U.S. Army Air Corps flew 700 miles out to sea, locating the Italian liner *Rex*, during the recent manœuvres.

A recent *Notice to Airmen* reminds civil pilots that except in cases of real emergency they must not use Royal Air Force aerodromes without prior permission.

An international aviation exhibition, the first of its kind in Yugoslavia, is to be held at Belgrade, from May 28 to June 13. The Yugoslav Royal Aero Club (4 Uzun Mirkova, Belgrade) is sponsoring the show.

Preliminary tests have been made with a new Soviet airship, the USSR-V-10. There is accommodation for a crew of eight, and power is provided by two 100 h.p. engines.

A world's closed-circuit endurance record is claimed by Japan for the monoplane *Wings of the Century*. Twenty-nine laps of a 402 km. course, which is equal to 7,300 miles, were covered in 62 hr. 27 min.

Mass formations of bombers and fighters are to tour Royal Air Force stations on Empire Air Day, May 28. There will be five bomber formations, each of which will cover a particular area.

Two fighter formations will make tours, one in the London area and another in the Midlands. There will also be six formations of aircraft of the Coastal Command, and they will tour certain sections of the coast.

"Flt. Lt. Hinckley, I.N.A. pilot, recently concluded, satisfactorily, a second England/India delivery flight. This time it was a D.H. Dragonfly—before it was a Vega Bull."—Indian Paper.

Twenty-five Years Ago

(*From "Flight," May 18, 1913*).

"Gen. Henderson very decidedly believes in the necessity of providing two types, at least, for military work, one machine to do the fighting, while the other is essentially a scout. Many of the audience, however, failed to see the necessity for the scouting type pure and simple, arguing that any war aeroplane must expect to fight and that any shelving of this aspect of the case is tantamount to begging the question."

Air Comdre. Weir and Group Capt. Pirie, leaders of the British Air Mission, arrived at Ottawa last Sunday. They will confer with Canadian officials and receive a full report of the capacity of Canadian companies to manufacture machines suitable for British needs.

The German Hamburg Ha. 139 seaplane *Nordwind* has crossed the South Atlantic from Bathurst to Natal, about 1,700 miles, in 11 hr. 11 min. This constitutes a commercial speed record. The machine is a low wing monoplane with four Junkers Jumo 205 diesels.

The City of London Corporation has decided to appoint a committee to scheme the laying-out and establishing of its airport at Fairlop, Essex. The site comprises 932 acres and includes the grounds and buildings of Aldborough Hall.

Lord Sempill is to read a paper on international air transport at the International Engineering Congress, which is to be held at the Empire Exhibition, Glasgow, from June 21 to 24.

Mlle. Elizabeth Lion has beaten, by 89½ miles, the women's solo long-distance record set up by the late Miss Amelia Earhart in 1932. In 21 hours she flew from Istres to Abadan, Iran, a distance of 2,562 miles. The machine was a Caudron Aiglon monoplane with 140 h.p. Renault engine.

Congratulations to Flt. Lt. C. A. Washer on his escape by parachute from a Wellesley when it caught fire in the air on May 13. Unfortunately, his technical observer, Mr. P. H. Warren, was killed in the accident. Of five machines attached to the Long-range Flight, this is the second to be lost.

"*Flight*" *photograph.*

FULL-LOAD TRIALS: Twice last week the Short-Mayo composite made successful tests of separation with *Mercury* loaded to 20,800 lb. The trials took place off Felixstowe, and on the first occasion the machines were piloted by Short's test pilots, Messrs. Parker and Piper. On the second they were flown by Sqn. Ldrs. Martin and Pickles, of the Marine Aircraft Experimental Establishment. With practically no wind, the take-offs were made in about 17 seconds. The picture shows *Mercury* being lifted by the Felixstowe crane. *Maia* can be seen afloat beyond the jetty.

SERVICE AVIATION

Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad

BOTH ENDS OF THE STRING : On Empire Air Day visitors will be able to witness the operation of barrage balloons at Cardington. A new type of mobile winch is used.

Balloon Barrage Progress

THREE balloon barrage squadrons of the Auxiliary Air Force commenced to form last Monday, May 16, at No. 1 Balloon Centre, Kidbrooke, London, S.E.3. These are Nos. 901, 902 and 903 (B.B.) Squadrons and are the first units to be organised in the new Group. Administration will be by the County of London Territorial and Air Force Association and recruiting started from the date of formation.

Regular N.C.O.s and airmen have completed training at Cardington, Beds, as instructors for the new squadrons and the necessary accommodation for the units has been completed. The total number of personnel eventually required will be about 6,000, but the majority will not be entered until later.

Service in a Balloon Squadron will be similar to that in the Auxiliary Air Force or the Territorial Army, but rather less exacting. Men will be required to attend for evening or week-end training, to put in a certain number of parades in the course of the year and to attend fifteen days' annual training. Engagement will be for a period of four years and re-engagement will be allowed for one, two, three or four years at a time. Bounties will be paid and pay will be issued during annual training. Lectures on balloon operation will be followed later by practical work.

The lower age limit for enlistment has been fixed at 38, thus an excellent opportunity for men of over normal Service age is provided. Recruits will be enlisted as aircraftmen second-class, and on satisfactory completion of training they will be eligible for promotion.

Seven other auxiliary balloon squadrons are to be formed shortly in Surrey, Middlesex and Essex. These squadrons will be located at balloon centres now under construction at Hook, Stanmore and Chigwell in the respective counties, and recruiting on a limited scale for one squadron in each of these districts also commenced last Monday. Application should be made to the following addresses: No. 904 Squadron, Hook, Mansfield Road, Hook, Surbiton, Surrey; No. 907 Squadron, Stanmore, Stanmore Park (adjoining Stanmore Church), Stanmore, Middlesex; No. 909 Squadron, Chigwell, Essex Territorial Drill Hall, Loughton Way, Buckhurst Hill, Essex.

Command of No. 824 (T.S.R.) Squadron

THE command of No. 824 Squadron in H.M.S. *Eagle* has been taken over by Sqn. Ldr. R. G. Forbes. The squadron is equipped with Swordfish and attached to the China Station. Sqn. Ldr. Forbes succeeds Sqn. Ldr. Woodhall and has for the past two years been with No. 822 Squadron in H.M.S. *Furious*.

Whitleys I, II, III, and IV

IN the short time since the first Whitleys entered service three more Marks have appeared. The Whitley I is powered with 775/805 h.p. Tiger IXs and has a maximum speed at 7,000ft. of 192 m.p.h. The Whitley II has the more recently introduced Tiger VIIIs with two-speed superchargers, and these give 805/845 at 6,250ft. and a maximum of 780 h.p. at 14,250ft. The take-off power is 920 h.p. As may be expected this Mark is somewhat faster and attains 215 m.p.h. at 15,000ft.

The Whitley III is powered similarly but will incorporate an improved form of bomb stowage which necessitates certain structural alterations to the fuselage.

As announced recently in *Flight* an order has now been placed for the Whitley IV powered with liquid-cooled Rolls-Royce Merlin engines—probably the Merlin X. The performance should in this case undergo a further "bump-up" and the altitude speed will probably be 15 to 20 m.p.h. better.

Helping the Benevolent Fund

UNTIL this year the Council of the R.A.F. Benevolent Fund has received considerable donations from the public and the Royal Air Force through the Hendon Display. These have now ceased and, although the capital sum with which the Fund was started after the war has been augmented by investment, and produces an income which goes a good way towards covering the need of dependants, the balance must be found by subscription from the general public.

The Council hopes that assistance will continue to be forthcoming from Empire Air Day and other displays, but such events constitute an uncertain source of income and the Fund may be faced with the task of finding an extra £6,000 a year.

Post-war cases are dependent upon the money which can be raised annually, and the effect of the expansion is already being felt by the Fund through the additional calls made upon it. Expenditure on post-war cases is expected to be doubled within a few years.

The Service is determined that no situation shall arise where it can be said that income is inadequate for post-war personnel in distress and that they cannot be helped without depleting the capital of the Fund. Serving personnel have therefore decided that the needs of post-war cases shall be, to a great extent, shouldered by themselves by making a voluntary subscription of one half-day's pay per annum.

Representatives of the Comrades of Royal Air Force Association have been invaluable voluntary helpers in recent years.

Expenditure in the past was mainly upon war-time ex-officers because of the high proportion of officer casualties. The present-day casualties are, however, higher among airmen than officers, with the result that all ranks are now brought equally into contact with the Fund.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—

A.P/O. Errol Desmond Gimson lost his life in an accident which occurred at Sealand on May 6 to an aircraft of No. 5 F.T.S., Sealand, Queen's Ferry, Chester. A.P/O. Gimson was the pilot and sole occupant of the aircraft.

No. 741397 Sgt. Stephen Henry Douglas Leech lost his life in an accident that occurred on May 7 at Lockswheath, Hants, to an aircraft of No. 3 Elementary and Service Flying School, Hamble. Sgt. Leech was the pilot and sole occupant.

P/O. Hugh Henry-May lost his life in an accident which occurred at Kenley, Surrey, on May 10 to an aircraft of No. 3 (F.) Sqn. P/O. Henry-May was the pilot and sole occupant.

P/O. Ivor Jack Fawdry and P/O. Colin James Carr Lee lost their lives in an accident which occurred near Godmanchester, Huntingdonshire, on May 10 to an aircraft of No. 139 (B.) Sqn., Wyton, Huntingdon. P/O. Fawdry was the pilot and P/O. Lee the other occupant of the aircraft.

P/O. Richard Douglas Hamilton Maxwell and No. 563262 Cpl. David Spencer Wissett lost their lives, and No. 566975 A/C. 1st Class Whitfield Dodds was injured in an accident which occurred at Hemswell on May 10 to an aircraft of No. 144 (B.) Sqn., Hemswell, Lincoln. P/O. Maxwell was the pilot and Cpl. Wissett and A/C. Dodds were the members of the crew.

An accident occurred at Wyton, Huntingdon, on May 10 to an aircraft of No. 114 (B.) Sqn., Wyton, in which the following occupants lost their lives:—P/O. Douglas Perry, No. 524637 A/C. 1st Class John Joseph Gerrard Rice. No. 523273 A/C. 1st Class Frederick Crimes. P/O. Perry was the pilot and A/C. Rice and A/C. Crimes were the members of the crew.

SERVICE AVIATION (CONTINUED)

Royal Air Force Gazette

General Duties Branch

The following F/O.s are promoted to the rank of Flt. Lt. on the dates stated:—E. M. Withy (A./Flt. Lt.) (March 6); R. L. Vivian (A./Flt. Lt.), R. V. L. Pattison, D. G. H. Spencer (April 22).

The following F/O.s are granted the acting rank of Flt. Lt. on the dates stated:—E. H. P. Clarke (since promoted) (July 5, 1937); R. G. D. Wight (February 28); G. M. Fidler (April 1); R. P. Widdowson (April 15); W. G. Wells (April 23).

F/O. R. H. N. Graham (Capt., The West Yorkshire Regt.) is granted the honorary rank of Flt. Lt. (October 1, 1937); Flt. Lt. D. C. J. Miller (Capt., 17th/21st Lancers) is granted seniority in his present rank on January 1, 1937.

Royal Air Force Appointments

General Duties Branch

Squadron Leaders.—R. G. Forbes, to No. 824 (T.S.R.) Sqn., Far East; to command, 27.4.38. W. G. Campbell, to H.Q., R.A.F., Middle East, Cairo, Egypt; for Engineer Staff duties, 30.4.38. R. R. Nash, to No. 215 (B.) Sqn., Driffield; for Flying duties, 4.5.38.

Flight Lieutenants.—H. V. Alloway, to No. 4 F.T.S., Abu Sueir, Egypt, 30.4.38. D. G. Lewis, to No. 70 (B.T.) Sqn., Habbaniya, Iraq, 30.4.38. C. E. Littler, to Directorate of Equipment, Air Ministry, 2.5.38. J. M. Warfield, to R.A.F. Station, Kalafrana, Malta, 30.4.38.

Equipment Branch

Squadron Leaders.—S. Bingham, to R.A.F. Depot, Middle East, Aboukir, Egypt, 30.4.38. F. D. D. Gaussen, to Supply Depot, Palestine and Transjordan, Sarafand, 30.4.38.

Flight Lieutenants.—W. J. B. Elliott, M. H. Robinson, A. J. Howell, to Directorate of Equipment, Air Ministry, 9.5.38. W. A. D. Collingwood, to H.Q., Bomber Command, Uxbridge, 29.4.38.

Accountant Branch

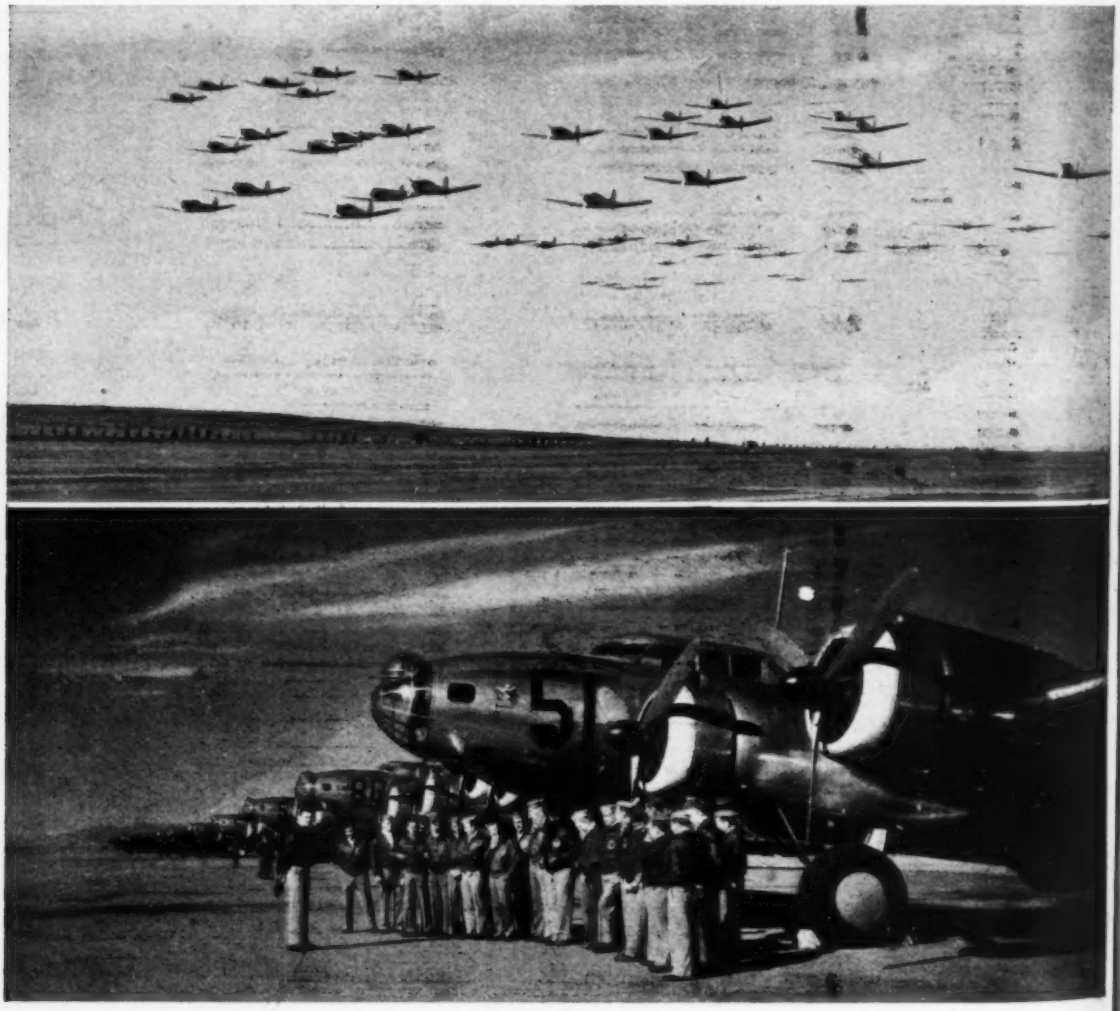
Squadron Leaders.—G. Goodhall, to Directorate of Equipment; for duty vice Sqn. Ldr. V. G. A. Bennett, 14.4.38. R. T. Carter, to R.A.F. Station, Habbaniya; for Accountant duties, 30.4.38.

Flight Lieutenant.—S. W. Hill, to No. 207 (B.) Squadron, Cottesmore, 22.4.38.

Medical Branch

Squadron Leader.—F. E. Johnson, to R.A.F. Station, Upper Heyford; for duty as M.O., 3.5.38.

Flight Lieutenants.—A. S. Amsden, to R.A.F. General Hospital, Habbaniya, 7.4.38. L. E. A. Dearberg, to Central Medical Establishment, London, 1.5.38. C. R. Palfreyman, to Princess Mary's R.A.F. Hospital, Halton, 1.5.38. A. M. Weston, to R.A.F. Station, Digby, 1.5.38. V. D Jones, to No. 31 (A.C.) Sqn., Karachi, India, 8.4.38. R. C. O'Grady, to No. 5 (A.C.) Sqn., Rawalpindi, India, 3.4.38. E. S. Sidey, to No. 28 (A.C.) Sqn., Ambala, India, 5.4.38.



AMERICAN SHOWMANSHIP: The mass formation in the upper picture is led by Northrop A.17.A attack machines, followed by Douglas B.18s, which may be regarded as the bomber derivative of the commercial D.C.2; Boeing YB-17 four-engined bombers bring up the rear. The machines in the line-up below are also YB-17s. Both pictures are from the M.G.-M. film *Test Pilot*, which has its première at the Empire Theatre, London, tomorrow (Friday).

SERVICE AVIATION (CONTINUED)

BARRAGE BUOYS: Barrage balloons inside the big shed at Cardington, formerly the airship station and now the Balloon Training School. The formation of ten barrage units has been announced.

Sack-type containers are constructed to hold 44 and 176 lb. For the smaller model the canopy has an area of 130 sq. ft.; the hemp sack is cylindrical in form and its dimensions are 9 x 21in. The 176-lb. model has 463 sq. ft. of supporting area and the dimensions of the container are 19 x 35in.

Metallic containers are of welded-steel sheet with four rubber feet to absorb the landing shock. The area of the canopy used with them is 1,076 sq. ft., and several seconds are required for its complete unfolding. This means that the containers may not be dropped from below 500ft.

FOREIGN SERVICE NEWS

The Martin Modernised

THE latest development of the Martin twin-engined monoplane bomber is the 166 with two Pratt and Whitney Twin Wasp radials rated at 1,020 h.p. This model has been released for export and has an estimated top speed of 255 m.p.h. at critical altitude. It resembles the machine entered by Martin for the last U.S. Army Air Corps bomber competition which was won by the Douglas B18. At that time it was learned that the Martin was suffering from "filleting troubles."

The Belgian Battles

THE Fairey Battles now being delivered to Belgium differ in some details from the standard R.A.F. model. Although camouflaged, the machines are finished in lighter colours with a blue-grey for the under surfaces. A more glossy surface increases the speed, it is gathered, by something like 10 m.p.h. The radiator housing is longer, shallower and wider, and contains the carburetter air intake, which is of modified shape. Following R.A.F. practice the machines have no spinners, the gain in performance with such a refinement being negligible.

Afghan Air Force

DURING the past few weeks many British and Italian aeroplanes have been delivered to the Afghan Air Force, which has been in a state of reorganisation for several years.

Enquiries made at the Afghan Consulate in Karachi revealed that 24 aeroplanes from Italy and 22 from Great Britain have been so far dispatched by road through Khyber Pass for Kabul.

A number of Afghan youths are being trained in England, Russia and Italy. Thirty of these pilots went to India some time back and after two months' practical course at the R.A.F. station at Drigh Road, left for Afghanistan. It is understood more pilots will be sent to India and other places for practical training.

Aerodromes have been planned at Hirat, Kandahar, Muzari Sharif and Jalalabad.

Italian Supply Dropping

THE first large-scale use of supply-dropping aircraft was made, it is claimed, by Italy during the Abyssinian campaign. Apart from wide-spread provisioning, deliveries were made to the most inaccessible localities of petrol, live animals, spare parts for engines, and radio equipment. In some instances not only were medical supplies and instruments dropped for an urgent operation, but the surgeon himself landed alongside by parachute. Some information on the supply-dropping apparatus employed has just been received from an Italian source.

Two main types of containers were developed: the sack type for solid or powdered commodities which would not suffer from the slight landing shock, and metallic ones for liquids and fragile objects.

Salvator parachutes with static lines 13ft. long are normally employed by the Regia Aeronautica. To drop the container it is necessary to fix the fastener of the static line to a substantial part of the aircraft and to drop the container overboard, if possible with the parachute canopy uppermost. As soon as the static line is unwound a string cutter severs the cord fastening the two extremities of the container and the parachute is extracted.

ITALIAN ECHELON: Caproni A.P.1. two-seater fighter-attack machines of the Regia Aeronautica put up a very creditable piece of formation flying.

New Machines for Greece

AFTER extended tests with equipment from several countries, the Greek air force has taken into service a number of P.Z.L. P.24 single-seater gull-winged fighters powered with the Gnome-Rhône 14No engine and armed with two 20-mm. shell-guns and two rifle-calibre machine guns. Of the 36 examples ordered, several have already been delivered and have given a demonstration at the Tatoi aerodrome before His Majesty King George II of Greece, who has a very extensive aeronautical knowledge.

To complete the re-equipment of its air force Greece has also ordered from France twenty-four Potez twin-engined fighter-bombers (Gnome-Rhône 14 Mars small-diameter radials of 700 h.p.). For torpedo and bomb dropping the Dornier Do. 22 floatplane with Hispano-Suiza series Y engine has been adopted.

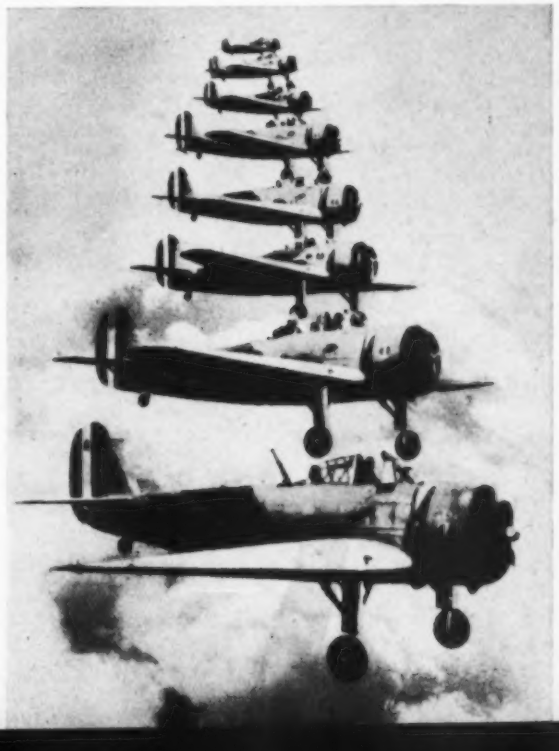
Figures for the Do. 17

ALTHOUGH when *Flight* published its long illustrated description of the German Dornier Do. 17 on April 14 figures for weights and performance were not available, some data for the Gnome-Rhône-engined version as supplied to Yugoslavia have just become available.

The Yugoslav government has ordered thirty-six Do. 17s, more than fifteen of which have already been delivered by air from Friedrichshafen to Belgrade, the average speed for the trip usually being about 250 m.p.h., never falling below 230 m.p.h.

Eighty Gnome-Rhône 14No two-row radials of 1,000 h.p. each were ordered for installation in the new machines.

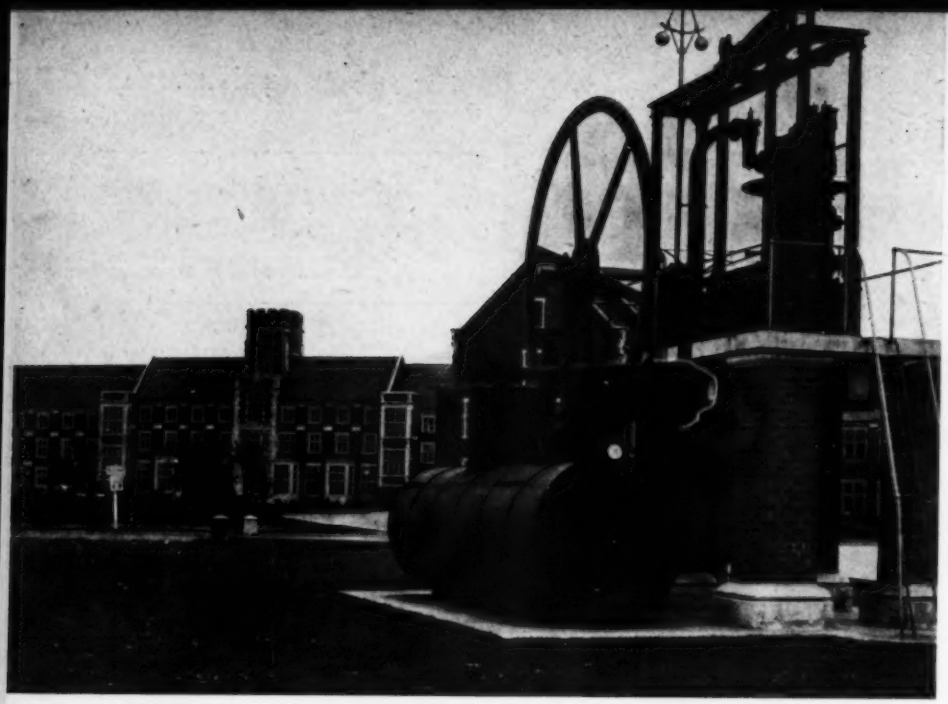
As powered with these engines the Do. 17 has the following characteristics: weight empty, 9,520 lb.; weight with equipment, 10,375 lb.; bomb load, 2,200 lb.; gross weight, 14,100 lb.; top speed at 11,150ft., 260 m.p.h.; stall, 63.5 m.p.h.; ceiling, 32,500ft.; range, 1,550 miles.



APPRO[illegible]H to [illegible]CA

A Visit to the Aero[illegible] Engin[illegible] Lough[illegible] Colle[illegible]

Illustrated [illegible]" Photo[illegible]



One of the fine residential halls, situated on the outskirts of Loughborough. Rutland Hall, as the central building is called, is as lavishly decorated and finished as the exterior and name would suggest. A well preserved museum-piece sets off the entrance.

THERE are only a very few establishments in the country which are adequately equipped to give a complete training in aeronautical engineering, and Loughborough College, Leicestershire, can fairly claim to be one of these.

On leaving school a boy and presumably a girl, too, may go to a university for a three- or four-year course in engineering, and on coming down enter one or other of the large aircraft factories under an apprentice scheme to continue with practical training for a further two or three years

Disadvantages of this course appear to be chiefly the time and expense involved and the fact that the training with one firm must necessarily limit the scope of the practical aeronautical experience gained. Unless the student trains with a firm with the definite intention of taking employment with that firm after completing the course, it is often preferable to spend a reasonable period of, say, five years from matriculation in gaining a thorough general knowledge of all branches of aeronautics; then, having obtained a post with a firm, the student may set about getting accustomed to their particular methods.

That general knowledge can be obtained at such an establishment as Loughborough College, which has held an enviable reputation for engineering training for many years; more recently the aeronautical side has been strongly developed. The course normally takes four years, with a fifth if an honours diploma is required. During the first two years the lectures are practically the same as for general engineering, and physical as well as mental training is included in this period.

In the following years the lectures become more specialised and include aircraft construction, stress analysis, engines, materials strength and metallurgy.

Energy and Enthusiasm

Probably due to the energy and enthusiasm of the Head of the Aero Department, Flt. Lt. H. E. Falkner, B.A. (Cantab.), D.I.C., A.F.R.Ae.S., the equipment in the aero engine and aircraft sections and in the aerodynamic laboratory is exceptionally good.

Unlike many engine instructional departments, Loughborough holds designs representative of the latest form of construction. Several historical units are also included in the list. Among the units represented are a supercharged Rolls-Royce Kestrel, a Gipsy Six, and several Bristol and Armstrong Siddeley engines of types still in regular service. The engine components are each studied separately, and rigs have been designed and produced for magneto and carburettor testing.

The airframe department is equally well equipped. Modern constructional practices can be studied in such a notable prototype as the Blackburn H.S.T.10, rigging exercises are carried out on a Wapiti wing, and the single-float experimental Fairey machine, a Bristol Bullpup and numerous parts—including a stainless steel float, Oleo legs and airscrews—supply other practical information. The Fairey long-range monoplane has now been dismantled at Loughborough and the Gloster survey machine is kept outside on the playing fields.

Indicative of Loughborough's practical attitude is the fact that metal tubes and spars from machines no longer required have been cut up and welded into tables, trestles and racks.

A 70 m.p.h. wind tunnel with a 10 h.p. motor is used, in conjunction with a number of ingenious models to demonstrate various principles in the aerodynamic laboratory. Having spent an hour with the wind tunnel no student could doubt the existence of wing-tip vortices or the effect of streamlining.

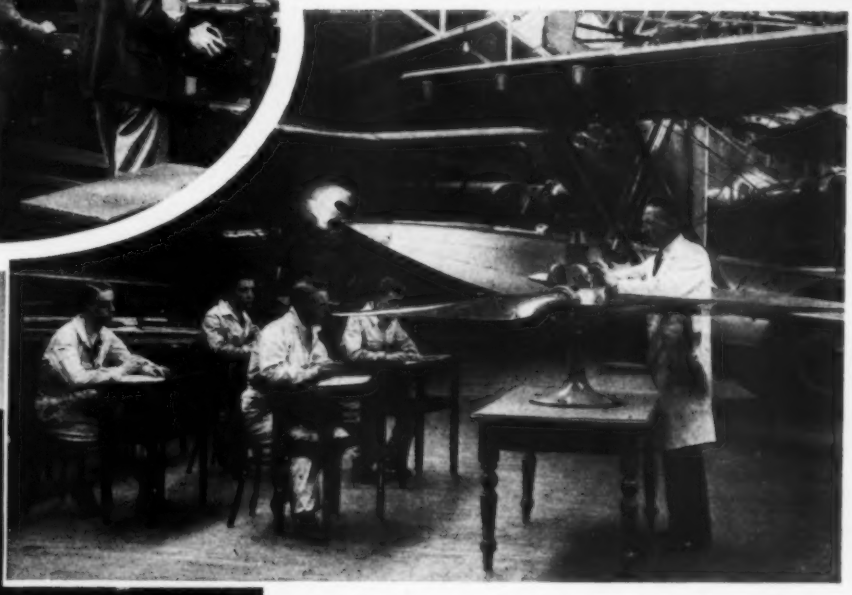
Instruction at Loughborough is divided up into weeks, a week's theory being followed by a week's practice, and so on.

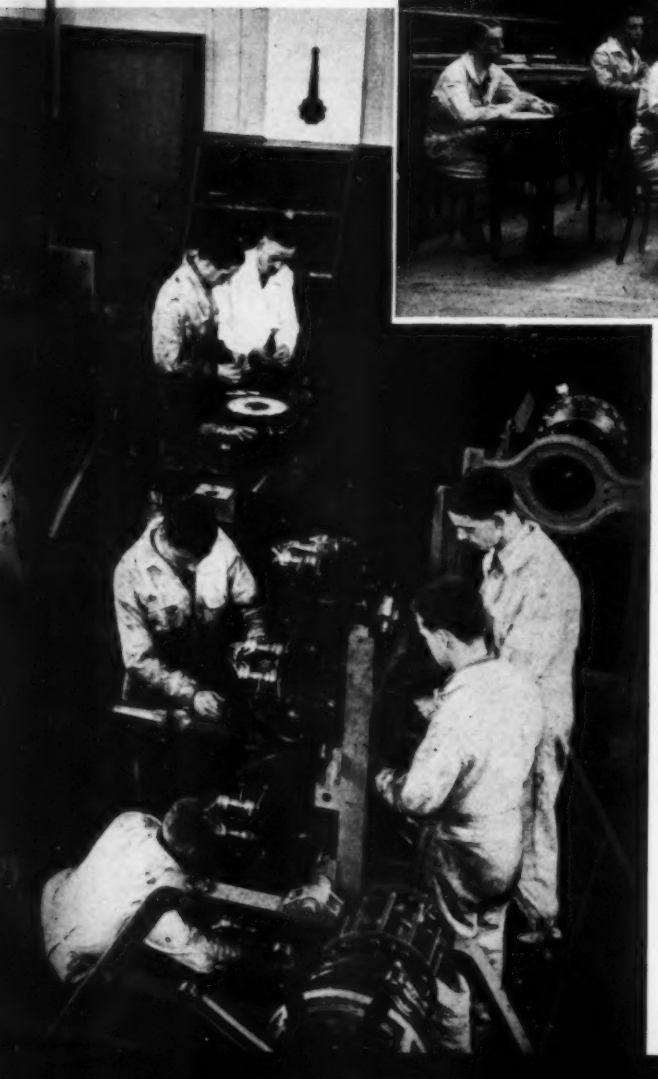
Special facilities are given to students to fly at Braunstone

OUGH
& CAREER

Aero Engineering Section of Lough College

Illustrated by" Photographs





(Top Right). Experience of modern aircraft construction is gained from the Blackburn H.S.T.10. (Centre). In the aerodynamics laboratory is a wind tunnel, built by the students. (Above). Instruction in the assembly and operation of a De Havilland v.p. airscrew. (Left). The aero engine section witnesses Loughborough's belief that in aeronautics knowledge of out-of-date designs is of very limited value.

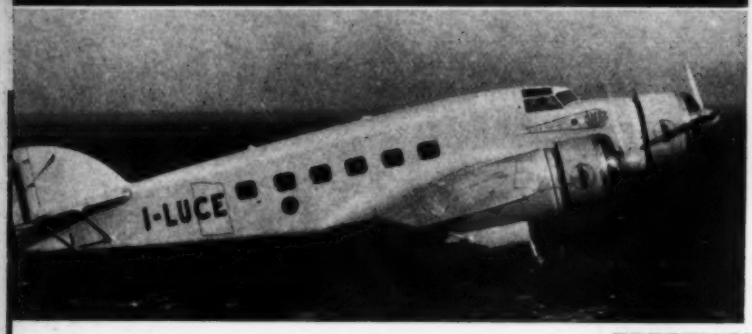
Aerodrome, but the College has obtained a twenty-year lease of the new municipal aerodrome now under construction, and is to have hangars, test-beds, and modern equipment there.

Turning again to the College in general, at which there are some 500 engineering students, accommodation is provided at six establishments within walking distance of the main buildings. There are full games facilities, including a large number of tennis courts, a first-class pavilion built by students, an outdoor swimming pool, and—at present under construction—an indoor swimming pool and gymnasium.

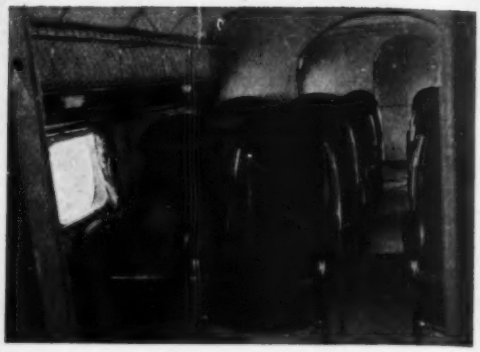
The College meteorological station produces weather reports for the local newspaper.

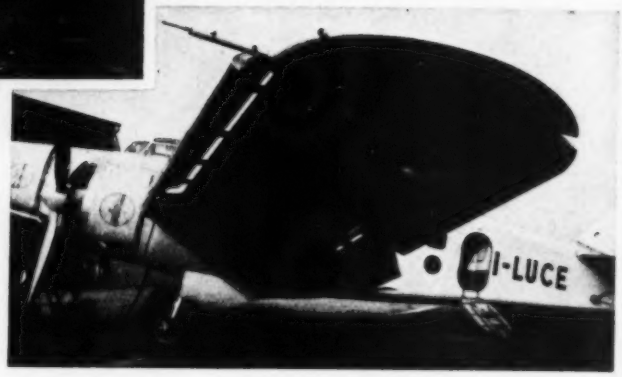
General engineering and first- and second-year aeronautical students work together in the various machine shops in the main buildings. Practically all the work carried out is used in the industry and makes these shops almost self-supporting.

Some years ago, with Admiralty permission, a party of engineering students removed the engines and generators from two ex-German submarines and took them back to Loughborough, where they were reassembled and have since supplied current for lighting and power to all the College buildings.



The top photograph is of the S.75 which, though it has the same power plant and general form as the S.83 below, is considerably larger.





Slot, flap and elevator treatment are shown well in this view of the S.83. (Above) Twenty-four passengers can be transported at over 200 m.p.h. in the roomy cabins of the S.75, but the usual three-abreast arrangement is for 18 seats.

THE LATEST SAVOIAS

Some Pictorial Aspects of Two Italian Transports

ITALY still champions the tri-motor aeroplane. The Savoia-Marchetti S.83 and the newer S.75 are both very efficient mail or passenger machines of mixed wooden and metal construction. Slots and flaps reduce the landing speed to an efficient minimum, while, as will be seen from the table, operational speeds when cruising economically are high. The cabins are comfortable and roomy, and seat 10 in the case of the S.83 and 18 in the S.75.

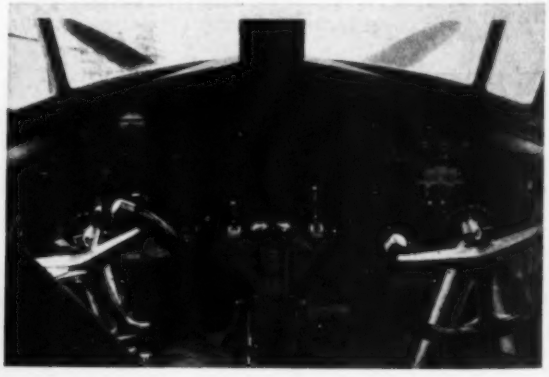
Luggage is carried in compartments below the cockpit and cabins and in the wings. Additional compartments can be arranged behind the engine nacelles and in the rear portion of the fuselage. The engines are Alfa-built Pegasus of some 750 h.p. output; on the larger S.75 1,000 h.p. Piaggios are alternatives.

SAVOIA-MARCHETTI S.75.
(Three 750 h.p. Alfa-Romeo 126 RC. 34 engines)

Span ...	97ft. 6in.	Length ...	71ft.
Wing area ...	1,275 sq. ft.	Wing loading	25.1 lb./sq.ft.
Weight empty	21,000 lb.	Weight loaded	32,000 lb.
Max. speed	228 m.p.h.	Cruising speed	202 m.p.h.

SAVOIA-MARCHETTI S.83.
(Three 750 h.p. Alfa-Romeo 126 RC. 34 engines)

Span ...	66ft. 3in.	Length ...	53ft. 2in.
Wing area ...	656 sq. ft.	Wing loading	23.1 lb./sq. ft.
Weight empty	15,180 lb.	Weight loaded	22,600 lb.
Max. speed	264 m.p.h.	Cruising speed	236 m.p.h.



That the S.83 is no exception to the rule of neat grouping of controls and instruments on the modern transport machine may be gathered from the photograph above. (Left) Luggage on both 83 and 75 is stowed below the cockpit and cabins. Either two-position or constant-speed Savoia-Marchetti metal airscrews can be fitted.

"SCHEME L"

Debates in Lords and Commons Indicate Growing Dissatisfaction with Aircraft Production

IF they did nothing else, the Debates in the House of Lords and House of Commons last Thursday indicated the almost unanimous feeling throughout the country that all is not well with the R.A.F. expansion. The statements made by the Secretary of State for Air, Viscount Swinton, in the Lords and by Earl Winterton in the Commons did little towards allaying the general anxiety. The Government spokesmen took the somewhat illogical course of using a statement of further expansion as a reply to critics who wanted to know why we were behind with production under the present expansion scheme.

IN THE LORDS

VISCOUNT SWINTON explained that the decision of the Government announced by the Prime Minister before the recess, involved two things: the acceleration of the existing programme and a considerable expansion of that programme. In a very long speech the Secretary of State for Air recapitulated recent expansion history which, however, may be assumed to be well known to readers of *Flight*. He pointed out that the industry itself had expanded enormously, the number of people employed in it having risen from about 30,000 in 1935 to more than 90,000. The acceleration of the new expansion orders given was expected to give an increase in output in this financial year of well over 50 per cent. and doubling this year's output during the next financial year.

Viscount Swinton said in connection with the complaint of too many different types of aircraft that the Air Ministry were steadily reducing the number. There were 1,750 of one aircraft on order with three firms. Of another machine 1,500 were on order from two firms. Of a third type 900 were on order from a single firm.

The Air Minister said that while it was right to utilise to the full the capacity of the aircraft industry on all-metal aircraft it was desirable that in case of war additional machines could be brought in, the labour and material for which would be readily available, and that in peace time that labour and material were used on work not connected with the aircraft industry. In order that the design and manufacture of aircraft of this composite construction could be fully tested in peace time, the Air Ministry had ordered the manufacture of an aircraft so designed that it would embody in its construction materials not used in ordinary Service aircraft.

Viscount Swinton was not very clear when he hinted at the possibility of certain reorganisations in the Air Ministry. It was gathered that he was referring to the Departments of the Air Members for Research and Development and for Supply and Organisation. He said that the aggregate volume of work would not grow less with the expansion but probably greater and they were reaching the stage where, although production was much greater, the supply side was a much less complicated problem. He felt that they had reached the stage at which a change, which he had always regarded as theoretically sound, had become administratively practical and desirable and he, therefore, proposed to make that change in due course.

Lord Addison asked the Noble Viscount to be a little more precise as to what changes it was proposed to make.

Viscount Swinton said he thought he had done so and he thought it was quite simple. Hitherto in the organisation of the Ministry, Supply on one hand and Research and Development on the other had been under separate chiefs. He proposed that when the details of placing orders were through and the immediate work of the Winterton Committee finished, the orders to manufacturers should rest with one officer responsible for design and production. The moment a machine was received from the factory it would pass under the officer responsible for organisation.

Turning to the size of air force which it was intended to establish within two years, Viscount Swinton said the Metropolitan Air Force, i.e., squadrons stationed at home, would attain a first line strength of approximately 2,370. Overseas squadrons would be increased to a first line strength of about 490 and the first line strength of the Fleet Air Arm would be increased to not less than 500. To carry out this programme, the R.A.F. would need to recruit in the two years, 4,700 pilots, 33,000 airmen and 60,000 boys. Four more Service training schools would be established and the equivalent of eight new civil training schools.

LORD ADDISON, who got himself rather mixed up between blind flying equipment and de-icers when he was merely trying to criticise the Air Ministry for not having installed vacuum pump drive for gyros, complained that nowadays there was nothing comparable with the Ministry of Supply during the last war. He complained that we had not enough wireless operators and not enough navigators. The departmental scheme of the Air Ministry was wrong in itself. It was not a central organisation which could take cognisance of requirements, arrange them in proper form, secure their due assembly and deliver them to the forces. They ought to fashion a new type of departmental organisation suited to the great task. There was no indication in the Noble Viscount's speech that that was going to be done and until it was done we should have a prolongation of confusion.

THE MARQUIS OF LOTHIAN quoted a distinguished M.P. as estimating that the production of first line machines in Germany last March was 300 a month and that before the autumn it would be 500 a month. If that was so, the German production next year would be 6,000 and actually he thought German production next year would more probably be 8,000 first line machines. The Germans would then have a total of machines of all sorts of between 12,000 and 15,000. General Goering had said not long ago that his object was to have in a short time 50,000 pilots.

He had a great deal of sympathy with Viscount Swinton and was aware of the immense amount of work he had done, but he thought the fundamental mistake was made at the time when the Minister for Co-ordination of Defence was appointed. That was the moment when a Ministry of Supply should have been created. The Minister was now being asked to do something beyond human capacity.

Priority

LORD WEIR OF EASTWOOD said that three years ago the Government decided to increase British air strength as rapidly as possible, but without any special priority and without interference with normal, domestic and foreign trade. In the last few weeks the Government had decided not only to accelerate the existing programme, but to expand it considerably and both acceleration and expansion were to be secured under conditions of first priority in labour, material and facilities. As he understood it, nothing was to be allowed to stand in the way of achieving maximum rate of progress.

Lord Weir said that production was a much mis-used word and was frequently confused with the word supply. Production was the concern and responsibility of the aircraft manufacturers, not of the Air Ministry. With reference to inspection, Lord Weir said that the A.I.D. had played a definite part in raising the general level of British engineering quality and he would regard it as a retrograde step to relax in any way the existing standards.

THE MARQUIS OF LONDONDERRY seemed in the main to accept Viscount Swinton's statement as satisfactory. He recalled that there had to be a certain multiplicity of types when the decision was taken to order off the drawing board but he hoped it would be possible to revert to the prototype policy when it would be possible to reduce the number of types.

LORD MOTTISTONE complained that the production rate was far too slow. In the last war they had found the same difficulty and it could not be solved until they had established a Ministry of Supply or, as they then called it, a Ministry of Munitions. He did not think the difficulty would be solved now unless a Ministry of Supply were established.

VISCOUNT ASTOR expressed the view that the question was not whether output was being increased by x per cent., but whether, as a result of the efforts planned by the Government, they would be in a position to carry out what he would call for short, "the Baldwin pledge." In other words, whether in two years or four years' time they would have a guarantee of parity with any European power.

In replying to the debate, Viscount Swinton said that as regards comparative strength in the air, it was difficult to answer specific questions. The assessment of relative strength was the duty of the Government. The Government must have more sources of information at their disposal and a better capacity for checking and weighing the results than any individual, however well informed, could have. He did not like the term parity because it suggested that one took one country and said they had 10,000 machines, therefore, in another country there must also be 10,000 machines. It might be

that in one country there ought to be, not 10,000 machines, but 15,000. He would prefer to use the term "adequate for our necessities."

On the question of a Ministry of Supply, Viscount Swinton pointed out that if they were to have control of industry as they had in war then quite obviously a Ministry of Supply was necessary and inevitable. But that was not what they were working on now and he thought there could certainly be two opinions on the subject of whether they would be materially helped by creating a single Ministry to which would be transferred the supply sections of the three fighting services.

IN THE COMMONS

SIR HUGH SEELY asked for the setting up of a committee of enquiry to examine whether a ministry of supply should be established He referred to the fact that the heads of the Research and Development and of Supply and Organisation Departments are serving officers, and are at the Ministry for only three years. He also quoted the figures of 3,500 front line aircraft and a total of 8,000 aeroplanes for Germany. The latest Air Ministry expansion scheme would not enable us to catch up with Germany.

Sir Hugh Seely complained that of the 340 Hawker Hurricanes ordered in June, 1936, we had only 28 in service; that of the Spitfire type there was only one example; that jigs had been set up and plans worked out for 93 types of aircraft; that there were 34 different types of gun turret; that the modern gun in the R.A.F. is the 1914 Vickers; that to get the new Browning guns satisfactory arrangements have to be made for making 10,000 belt links a week; that one aircraft firm had to borrow £1 million from its bank on account of the Air Ministry's un-businesslike methods.

EARL WINTERTON outlined the new plan, which aimed at having, by the end of the financial year 1939-40, a Metropolitan Air Force first line strength of 2,370 aircraft; 490 overseas squadron first line machines, and 500 Fleet Air Arm aircraft, a total of just under 3,500. To-day the number of personnel in the R.A.F. was 70,000; by the new expansion a further 40,000 would be wanted. There would be eight new schools for elementary flying training, four new flying training centres. Then it was proposed to open new training schools at Cosford and St. Athan for 2,000 and 1,500 trainees respectively during the coming summer. The new schools at Yatesbury and Weston-super-Mare, each for 3,000 trainees, would be available during the winter.

Earl Winterton was challenged by several members when he said our machines were not below those of other countries in up-to-dateness.

Shadow Production

On the subject of shadow factories, Earl Winterton said the first machines from Austins were nearing completion, and deliveries should commence almost immediately. In the case of Rootes there had been some delay through the change of site. As regards engines, all factories were complete and in production.

Concerning modifications Earl Winterton quoted one instance of a machine in which 4,664 modifications were required. The firm's share was 4,623; the Air Ministry's alterations numbered 41, of which 22 were made on operational grounds, 6 on technical grounds, and 13 in order to meet defects revealed by service use.

With reference to the letter, copies of which were sent to the Press, of Mr. Sandys, Earl Winterton said that he would deal with three aircraft firms: De Havillands, A. V. Roe, and the Gloster Company. Mr. Sandys had said that until recently these firms were short of work. De Havillands had been standing off men because the Air Ministry had been obliged to cancel the greater part of an order for a type of training machine the design of which the Air Ministry was entirely unable to accept as satisfactory. Orders had now been placed with that firm for a training machine designed by another firm, and also for a machine designed by De Havillands themselves and already in production. A. V. Roe had manufactured a type of aeroplane largely wooden in construction. When requirements had been met it was impossible to order more, and workmen trained in construction which was purely wooden could not be utilised on metal machines at the same factory. The new scheme had made possible the placing of a further substantial order for the type employing both wooden and metal construction.

MR. ATTLEE asked for an enquiry. Present rate of production was something like 250 aeroplanes per month. Why had so little been done during the last three years? When expansion was decided upon a number of different types were put in hand, and to-day there were a great number of different types in production. If there had been real menace one would have thought that there would have been a concentration on the vital types, i.e., powerful fighters and long-range bombers. The trouble was that our aeroplanes were complicated to an unnecessary degree. He had, he said, details of a fighter aeroplane. In its construction there were 151 different sizes of bar, 147 different sizes of tube, 50 gauges of sheet, 105 sizes of rivet, and scores of different screws, nuts and bolts.

The gun position was unsatisfactory. The guns in use were obsolete, and there were only a few new ones in use. He was told that the Service was waiting for the Browning and the Vickers K, and there had been no practice with them by most of the gunners. Was it true, he asked, that the Ministry issued the wrong sort of cartridges, and that the gun or the cartridge had to be redesigned? Was the Ministry being held up by the firms holding rights in the pressure pump for revolving turrets?

CAPT. HAROLD BALFOUR pointed out that it was wrong to blame the Ministry for not having an Air Force on parity with the air forces of any other country in Europe. The Air Ministry was carrying out the policy authorised by Parliament. Broadly speaking, "Scheme F" was generally satisfactorily completed. If the scheme now proved quite inadequate, that was a matter quite outside the department, and criticism should be directed to high Government policy. He expressed the view that large production, without the long delays entailed by other methods of getting it, could be secured at once by a large and wholesale reversion to wood construction. "Call designers together," Capt. Balfour said, "and tell them that in six weeks they are to produce simple mass-production designs for a bomber and fighter type with performance as near as possible to that of existing metal types." He thought the prototypes could be produced in four months after the receipt of the design. Production would start in various factories, wings in one, fuselages in another, metal components in others.

Capt. Balfour was not in favour of an enquiry because it would waste the time of people who were better employed on getting on with their work.

Ministry of Supply

MAJOR LLOYD GEORGE found it difficult to accept Earl Winterton's assurance concerning our relative strength and said there was serious apprehension as far as production was concerned. He also wanted to set up a Ministry of Supply.

MR. BOOTHBY, in referring to the high output of Germany, said that Earl Winterton and Lord Swinton had to be measured as administrators against Field Marshal Goering who was one of the greatest administrators of modern times. He had created, under conditions of secrecy to begin with, the most tremendous weapon of war the world had ever seen. That was the standard we were up against, and we had to do our best to come up to it. He suggested setting up in Canada, far away from any danger of bombing, a big factory for the construction of aircraft with standardised engines, of uniform design and of modern type.

MR. STOKES said it was not his experience that modifications came mainly from the manufacturers and only a small number from the Ministry. He did not suggest that all supervision should be abandoned, but the manufacturer did not want to be treated as a criminal, and he submitted that there was a great deal too much interference, resulting in delays and in greatly increased costs of production. He thought people in the Inspection Department would admit that there was no one responsible man who had sufficient engineering knowledge and sufficient time to be able to say: "This is right, get on with it."

On the question of purchase of aircraft in America, he was astonished to learn that during recent months between 25 and 30 Bristol Blenheim bombers had been sent to Belgium, that in the early days of May a first consignment of 28 machines of the same type was despatched to Turkey and that the remainder would be despatched before the end of May. It seemed an astonishing state of things that we had not sufficient Bristol Blenheims, yet were able to supply Belgium and Turkey, and apparently had to go to America to make up the deficit.

WING CDR. WRIGHT did not understand why we, with far greater resources than the dictator countries could call upon, should always be dragging at the heels of those countries and why they should set the pace. If we really meant what we said, namely, that we wanted to make this country so strong that no other country would think it worth while to attack us, we should use our resources to the utmost and set such a pace that the other countries would not think it worth while to continue this mad race of armaments.

The Noble Lord had referred to the fact that only main firms could be entrusted with the supply of aircraft. He presumed that by "main" firms he meant those which were members of the S.B.A.C., the Society which paid the salary of Sir Charles Bruce-Gardner, who, as far as he could see, was in the extraordinary position of being on the Supply Committee of the Air Ministry and therefore had apparently become

(*Concluded on page 501.*)

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DUMPED

"Wasting" 1,000 Gallons—and Why

A REPORT of the full-load separation trials of the Mayo Composite Seaplane stated that of the 1,200 gallons of petrol with which *Mercury* was filled, a thousand gallons were dumped after a short flying trial in order that the seaplane could land lightly loaded.

Can anybody explain to me why it was necessary to waste a thousand gallons of fuel, quite apart from the obvious danger involved, on a test which could surely have been carried out just as well with tanks full of water? This kind of thing is well calculated to produce in the minds of the lay public the impression that all the old cheerful extravagant disregard of public funds still characterises the administration of our fighting services.

IGNORAMUS.

London, N.W.8.

[The answer to this very natural query is that, in the first place, the tank in *Mercury* runs through almost from wing tip to wing tip, and is separated into compartments by bulkheads in which there are flap valves. These valves permit fuel to run from the tips to the centre but not vice versa. Some of the inner valves *could* probably have been sealed, but one of the tests to be made was to check the proper functioning of the valves and whole fuel system. Thus it would have been impracticable to use anything but petrol.

Secondly, it was part of the official tests to see that the jettisoning of fuel could be carried out (a) without fumes forming in the cabin, and (b) without fuel getting near the engines where it could be set alight. There is a special process by which proximity of fuel to an object can be made to colour the object, and in this test it was found that nowhere had the fuel come close enough to any part of the aircraft to cause the slightest risk of fire.—ED.]

BUYING ABROAD

Could Holland Supply Us With Military Aircraft?

WE in England are led to understand that there is a serious shortage of military-type aircraft; in fact, so urgent has the position become that we have sent a mission to the United States to investigate the possibility of America being able to supply us with suitable machines.

Can any reason be given by the authorities to explain why it was considered necessary to go so far afield?

Just across the Channel is a neutral country called Holland, in which there are being built, near Rotterdam, the very machines that we require.

I refer to the firm of Koolhoven, who are not only offering for sale some very fine aircraft, but who are fitting engines of British design. Two examples may be cited: The F.K.51 military trainer, with Armstrong Siddeley IX Cheetah engine; the F.K.52 two-seater fighter with Bristol Mercury engine.

I contend that here are two types that have the initial advantage of being fitted with engines well known to the Royal Air Force and for which spare parts can easily be obtained, and that are well up on performance.

There are several other types made by the same firm, but these have engines of American origin. But, in spite of this, they are advertised as being capable of modification so that "any other engine of, approximately, the same weight and power" could be used.

Why not, then, let our friends in Holland begin to get busy on a substantial British contract? Perhaps someone can enlighten us.

JOHN V. HEWES.

Ashstead, Surrey.

RENFREW REFLECTIONS

Another Worry for the Internal Airline Operator

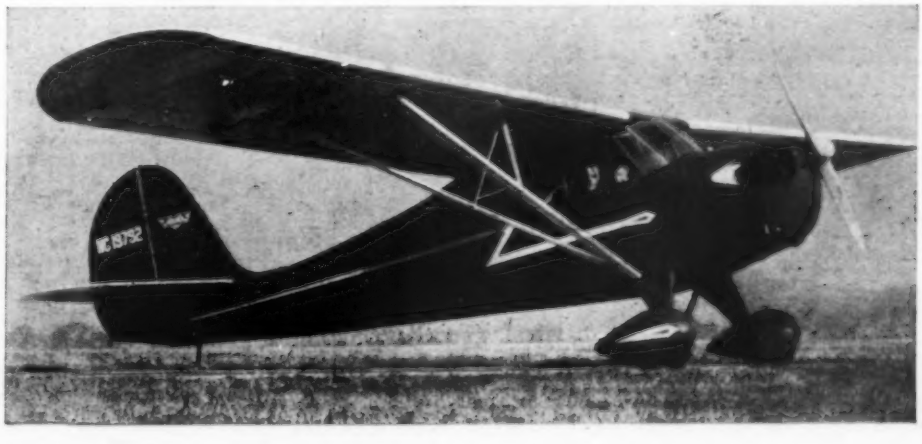
THE relationship existing between British internal air-route operators and the airport owners, upon whose good will the former are entirely dependent in respect of the operation of their services, has been brought prominently forward in the last few weeks through the action taken by the Corporation of Renfrew resulting from their disagreement with the Air Ministry.

An aspect of this matter which merits immediate recognition and demands early action by the Air Ministry appears to have been overlooked, namely, that the aircraft operator, in addition to the numerous handicaps with which he has to contend at the present moment, has been vividly reminded that all his efforts and the money he is expending may be thrown away in the not unlikely event of the airport authorities in the main centres to which he runs his services deciding that they are no longer content to bear the financial burden involved in continuing to provide an airport.

Up to the present time, the local authorities, with the encouragement of the Air Ministry, have committed themselves to an annual expenditure which varies according to the locality, and they are now getting tired of the procrastination and delay in forming a definite policy in respect of the development of British internal civil aviation. There is nothing to prevent any of them, at the shortest notice, actually putting into effect what Renfrew threatened to do, namely, disposing of their airport, which is a liability, and changing it into an asset by selling the site for building or other purposes. They could, if so disposed, just close down and allow the land to revert to agriculture, and still be better off.

The operator is obviously most unfairly situated, as it is he who spends his money on advertising the services and on building up the traffic, yet he is liable to lose everything in the event of the airport authorities doing what they are perfectly entitled to do, namely, cry "Enough! We are closing down."

The authorities at Renfrew were right in refusing to accept the compromise of a two years' recognition offered by the Air Ministry. After considerable bartering with the Ministry, it was extended to three years, and no doubt they accepted this offer bearing in mind the inconvenience and losses that the operator would sustain had they proceeded with their original intention of closing down.



THE LATEST AERONCA: Known as the "50," this new type is fitted either with the Menasco or the Continental engine — both new units. As in the case of the standard model, the occupants are seated side-by-side and, no doubt to provide the "big ship" atmosphere, wheel control is specified. The cruising speed is given as 90 m.p.h. and the landing speed as 30 m.p.h.

It is obviously an effort on the part of the Air Ministry to gain more time, and if we are to take it as an indication that three years is the period they propose to take in order to formulate an internal air policy it is time that all those concerned with the development of British civil aviation unite and insist upon immediate action being taken by the Air Ministry to consolidate the whole position and recognise that airports should be the business of the nation and not that of local authorities.

The provision of navigational facilities, such as wireless and night lighting, will be necessary sooner or later, but installing it at airports which might at the shortest notice close down if they felt so disposed is obviously unbusinesslike on the part of the Air Ministry, and the whole position is most unfair from the point of view of the airline operator.

If the Air Ministry will not take the initiative to have this matter reviewed and the whole question of British internal civil aviation soundly established, first in respect of assuring a continuity of operation of the airports, secondly, in the proper equipping thereof, and, thirdly, in providing the necessary assistance to enable internal air-route operators to tide over the initial period of development, the present unsatisfactory state of affairs will continue. There will be isolated instances where airports will close or threaten to close and where operators will cease their services or threaten to do so; and our prestige, on which it is proposed to expend a large sum in the form of subsidies for Imperial and Continental services, will surely not be enhanced in the eyes of the foreigner.

FREDERIC C. R. JAQUES,
Managing Director, North Eastern Airways, Ltd.

Croydon.

TRAINING AND SUBSIDIES

The Club and the Reserve School

THERE has been much written and, seemingly, much said in official quarters recently anent the subsidised flying clubs or schools.

In a world of anomalies, prevarication and procrastination, the subsidising for some sixteen years of organisations formed to teach flying and then the ignoring of their usefulness in a time of national rearming, stands as a supreme monument of wastefulness and sheer stupidity.

When a government not only ignores a chain of 57 flying schools (largely alive to-day through the assistance of public money in the past) as a basis of primary training, but takes away to train free the young men through the training of whom clubs earn their subsidies, the situation is ludicrous. It is said that in the immediate future there will be 40 Reserve and Auxiliary Reserve Schools, all of which will be directly competing (if to offer free something that has to be paid for elsewhere can be called competing) with the existing subsidised clubs for the limited number of young men who want to fly, but not as an occupation.

I am credibly informed that the official answer to this state of affairs is that the club cannot give that military discipline that the Air Force desires to instil into its recruits.

This argument is untenable. Learning to fly is one thing. Military discipline is another. Primary flying in the military schools and at the clubs is carried out in the same machines. There is an interchange of instructors who are passed out by one and the same standard by Air Ministry appointed people. The sequence in which the pupil at either club or military school is initiated into the art of flying is identical.

So much for the flying. Now for the military side. The similarity in the flying training does not end with flying alone and the interchange of personnel—many of the "military" schools are managed by favoured clubs under contract to the Government. They are all managed by civilian companies. Except when they are under the "military" training for a few hours a week, the person learning to fly is a civilian to all intents and purposes, and he lives at home or in lodgings.

I say that no one acquainted with Reserve Schools would be more impressed with the military discipline discernible in pupils lounging around the tarmac of a military primary training school than that to be seen at a club.

So much for the present. Then, if we are to profit by experience, this argument is even more futile, for during the last war people who had been taught to fly at civilian schools were very much in demand by both R.F.C. and R.N.A.S. It did not take long to convert them to military discipline: sometimes as long as it took to get a uniform made. Kitchener's army was converted from civilians to military discipline and fighting forces in three months, and I never remember having heard that it was essential for the preservation of military discipline to learn morse code, photography, or any other trade in the service.

Flying clubs should either be used by the Government or their subsidies taken away, compensation paid, and closed down.

From an economic standpoint they should be used. Each school should be allotted at least one prospective military pilot a month for primary training up to a standard laid down by the Air Ministry. The club should be paid an agreed amount by the Government for this training.

This would help all clubs in existence, whereas a suggestion that has been put forward asking for military candidates to learn to fly first at their own expense would only help the cut-throat club and those near large populations, and they are not necessarily the most deserving or those likely to survive the longest in time of war to carry out their lawful duties.

Barton, Beds. D. M. K. MARENDAZ.

"AUTOGIRO"

The Use of a Trade Mark

IN view of the rapid development taking place in rotary-wing aircraft of various types and the public interest roused therein, and of the coming into force on the first of this month of the Trade-Marks (Amendment) Act, which introduces some change in the position of "word" trade marks associated with patented articles, the present seems a suitable opportunity for drawing attention to our proprietary rights in the word "AUTOGIRO." This word is our registered trade mark No. 471452, and is only properly applicable to the products of this company (and of any of our licensees who may be given permission to use our mark as "registered users").

This word has been used in the Press to describe, and has tended to become associated in the public mind with, a type of aircraft having a freely rotating wing system and a separate engine and airscrew for forward propulsion. The correct technical description of such an aircraft is "gyroplane," which is defined on page 21 of the revised edition of 1933 of the *British Standard Glossary of Aeronautical Terms* issued by the British Standards Institute. A gyroplane is, therefore, distinguished from a helicopter (also defined on page 21 of the *British Standard Glossary*) in which the rotors or lifting screws are power-driven in flight.

We fully realise the difficulties with which the Press is faced in dealing with these proprietary words, especially when they have been associated with considerable publicity, but we are sure those concerned will appreciate our anxiety to preserve our proprietary rights in the word "AUTOGIRO" and to save the validity of our trade mark registration from being jeopardised. We think you will also agree that it would tend to avoid confusion if the technical terminology sponsored by the British Standards Institute were universally adopted.

THE CIERVA AUTOGIRO CO., LTD.,
R. BLAKE (General Manager).

[Although the Cierva Company has issued a circular letter to this effect merely for the information of various newspapers and journals, we reproduce the above for its intrinsic interest. *Flight* has always endeavoured to observe the distinction and to confine the use of the word "Autogiro" only to the products of the Cierva and associated concerns, other types being referred to as "rotary-wing aircraft" or "gyroplanes." We do take the liberty of omitting the inverted commas from "Autogiro," as in other aircraft types, for the good reason that any list of aeroplanes is irritating to the eye if surrounded by a forest of quotation marks. Incidentally, it would be interesting to learn the reactions of our good friends Messrs. Blake and Brie to that odd word which appears so often in the dailies—"Auto-gyro."—ED.]

IN BRIEF

"GYRO" (Rangoon) wonders as to the possibilities of an experienced, 32-year-old master mariner with a "B" licence graduating from sea to air as a civil pilot or navigator.

INTERNATIONAL AIRCRAFT, LTD., of Barton Aerodrome, Beds, draw attention to the fact that their Marendaz Mark III monoplane (Gipsy Six), which made its first public appearance at the R.Ae.S. Garden Party, was designed by Mr. D. M. K. Marendaz primarily as an advanced civil and military trainer. The size and comfort of its four-seater cabin are also intended to appeal to the private owner and the charter operator.

FLIGHT The Aircraft Engine and Airship

NEXT THURSDAY: ROYAL AIR FORCE NUMBER

PRIVATE FLYING

UP AND AWAY: An interesting little representative of the too-slowly-growing ranks of rotating-winged aircraft is the Kay gyroplane, which was demonstrated at the R.Ae.S. Garden Party. It has controllable-incidence rotor blades.

"Flight" photograph.

Topics of the Day

Proficiency

SINCE there is a most awkward gap between the capabilities of the barely "A" licensed pilot and one possessed of a "B" licence, it seems that the time has come for clubs to introduce some intermediate category, just as the powers-that-be are at present endeavouring to modify the "B" licence to suit both the probationary professional pilot and the full-blown transport expert.

At least one club has recently introduced a special qualification which amounts, in effect, to an amateur "B." A pilot with this "gold badge" will naturally be in a specially good position, and can be trusted to take any club machine more or less anywhere. Furthermore, he may, without further test or enquiry, try out any demonstration type which is brought along to the aerodrome.

Primarily, of course, the idea is intended to encourage flying beyond the "A" licence standard, and it is probable that quite a number of this club's pupils will, having obtained their "A" licence, do as much flying as possible in order to enter the new category. In other circumstances, the next stage would be the "B" licence, and this is both costly in acquirement and completely useless to the average amateur who has no intention of flying for "hire or reward."

From the club member's point of view, the scheme will do away with that somewhat anomalous state of affairs in which two pilots, each, say, with fifty hours' solo flying experience, are completely different in their capabilities. If one of them, however, is permitted to take a club machine to Timbuctoo, the other feels extremely ill-treated if he is not allowed to do likewise a few weeks later. The intermediate qualification will definitely distinguish between the thoroughly competent pilot and one whose flying is just so-so.

Complaint

DURING the past month I have made numerous landing circuits at two or three aerodromes where Reserve flying is carried out quantitatively at the week-end. At every one of them machines of various types were invariably littered all over the landing area, and, so far as I could make out, not one of the pilots concerned had the least intention of doing any immediate flying.

Not only were the machines a definite hindrance and danger to approach navigation, but on at least two occasions they positively prevented any other machine from making a landing without a good deal of violent manœuvring, both in the air and on the ground. The pilots were usually merely obeying the rules to the very letter and were waiting for my machine, and any others which were coming in at the same time, to complete their approaches. The good rule about remaining stationary in such circumstances is obviously one which must not always be taken too literally. In some cases motion in a certain specified direction is a good deal less annoying and certainly less dangerous than mere stationaryness.

When there is a large number of machines already waiting to take-off, or waiting to taxi back to a suitable take-off point, it is often advisable for the pilots in the second category to move as rapidly as possible towards the nearest boundary (unless special rules are in force at any particular aerodrome) and out of the way of any machines which are coming in. As it was, I made several approaches towards an area which was so thickly populated that there was not the least chance of completing a landing, and I merely hoped that one or more of them would either move away or take-off before I got there. During one period I was flying a fairly large twin-engine machine, and it was impossible to manœuvre it violently near the ground; furthermore, I had to remember that the necessity of making a second round would have involved me in quite considerable sums of plain cash. On that occasion the sight of half a dozen Harts and a dozen Tiger Moths, all pointing in different directions and remaining quite stationary in various parts of the landing area, was a very depressing one.

Anyway, the machines are meant for flying, and not to be used as uncomfortable mid-aerodrome armchairs while the pilots consider the causes of northerly turning error or ponder on the reasons for their last bad landing.

Comparative Stresses

NOT very long ago I was talking to a very experienced pilot who told me that he could not bear to see his throttle lever wide open, even though, when flying his machine at operating height, the engine, with its v.p. airscrew, is intended so to be driven.

That, I am afraid, is the result of past training, and it is probable that quite a large number of pilots have similar disinclinations. Obviously, the power output on full throttle at, say, 7,000ft., is nothing like as great as it is on part throttle at ground level, and the whole of the story is told by the pseudo-boost gauge when this is fitted. This gauge virtually shows the load which the engine is being made to take and if it is registering anything on the "minus" side, the engine is obviously running light.

At ground level it is necessary to throttle quite well back in order to keep the boost pressure well below the zero mark. The power of the engine is naturally dependent entirely on the amount of mixture which can be pushed in by atmospheric pressure, and, since the atmospheric pressure at 7,000ft. is a good deal less than it is at ground level, the power is naturally limited. Needless to say, this does not apply to a supercharged engine, but at the present moment no private owner's machine is so equipped. None of which appears to have been explained very clearly, but *I* know what I mean, anyway.

INDICATOR.

Private Flying

FROM the CLUBS and SCHOOLS

STRATHTAY

FOR the first week of May the amount of flying done was 23 hours. Mr. G. C. Halley left for Lympne in one of the club Moths to take his "B" tests, and his return is looked forward to with interest.

LONDON

The flying time for last week was 100 hr. 25 min. Messrs. A. R. Thomas and G. Wong made their first solo flights.

HYDERABAD

First solo flights were made by Maj. G. M. Dyer and Messrs. Rajeshwer and R. K. Munshi. A total of 92 hr. 5 min. made the total flying for the month of April.

REDHILL

The Redhill Flying Club put in 59 odd hours' flying last week, including a trip to Amsterdam, Brussels and Paris made by the Puss Moth. Mr. J. H. Mason went solo and Mr. A. J. Mulder obtained his instructor's licence.

HAMPSHIRE

Four aircraft flew to the Royal Aeronautical Society's Garden Party at Heathrow. Mr. J. L. Gregory carried out successfully his "B" licence cross-country flight. A total of 59 hr. 10 min. was logged for the week.

MARSHALL'S

With cross-country flights to all parts of the country, including stops at Hatfield, Norwich, Southend and Oxford, a total of 75 hr. 20 min. was put in during the week ended May 8, while for the week up to May 15 a further 66 hours were flown. Several new members joined.

ROMFORD

Miss Amy Johnson visited the Romford Flying Club last Sunday to present a flag and charter to the National Women's Air Reserve which operates there. There are 125 members of the Reserve, of whom 18 are taking flying instruction with Mrs. G. M. Patterson.

BORDER

Flying for May, up to and including last Thursday, made 42 hr. 30 min., but very little flying has been possible during the last week owing to high winds. The Border Flying Club Cadet Section is now taking shape and the inaugural meeting was held in the club-house on May 12.

HANWORTH

Among the visitors last week was the Baron von Bismarck, who is on a visit from Germany. Flying showed a considerable increase over the previous week—125 hr. 5 min. being logged. "A" licence tests were completed by Mr. N. W. F. Moore, and Mr. F. Sagrera has passed the technical examinations for his "B" licence.

BARTON (BEDS)

A cross-country flight was made to Nottingham last week, while all members attended the Royal Aeronautical Society's Garden Party. A Dawn Patrol, the first attempt of this kind on the part of the Bedford School of Flying, is arranged for Sunday, June 12, between 8.15 and 9, and an invitation is issued to all clubs.

CINQUE PORTS

The total hours for the week ended May 15 were 51, and Messrs. G. C. Halley and F. D. Wallace passed their "B" licence tests, while Mr. Scrivens gained his "A" licence. Two of the members, both private owners, Mrs. Macdonald and Mrs. Morris Davies, left for a tour of the South of France in the latter's B.A. Swallow.

DONCASTER

Although Doncaster Aero Club has been carrying on with only one B.A. Swallow, the flying time for the month ended May 9 totalled 27 hr. 20 min. By Empire Air Day, the fleet will include two B.A. Swallows, one Gipsy I Moth, fitted for night and blind flying, and a Puss Moth. Mrs. J. Corbett, Messrs. B. Wilson, and W. Youell made their first solo flights.

YORKSHIRE

Charter and joy-riding is in full swing and nearly 200 people took the air in the Short Scion. Members flew 61 hr. 15 min. for the week ended May 13, and 123 hr. 35 min. has been logged for the month so far. Mr. W. G. L. Brown has become the proud possessor of an "A" licence. An interesting programme has been arranged for Empire Air Day, with R.A.F. co-operation.

LEICESTER COUNTY

Notwithstanding the high winds during April, 128½ hours were flown. Messrs. J. Carter, R. Townsend, and K. Brooks made their first solo flights, and Mr. A. S. Carter obtained his "A" licence. Fifteen new flying members joined. It is hoped to open the new clubhouse at Whitsun, and arrangements are well in hand for the official opening of the aerodrome on July 23.

SOUTH COAST

A car arrival competition was held last Sunday, a bottle of champagne being the prize. This was followed by a gramophone dance in the club lounge. Several of the members are assisting in the arrangements for Empire Air Day, while Mr. Pashley is very busy in an endeavour to produce a record number of new "A" licences this year. Thirty-nine hours' flying were done by members, and Mr. Kennedy made his first solo flight on Friday the 13th.

C.A.S.C.

Eight members attended the aerodrome on Sunday and flew 5 hr. 20 min. Mr. Saunders did some useful solo and has now nearly completed the necessary solo time for his "A" licence. If negotiations at present in hand are brought to a satisfactory conclusion two C.A.S.C. Squadrons, No. 4 (Kent) and the proposed No. 5 (Essex), will operate from a proposed new aerodrome near Grays, Essex.

SOUTHEND

Flying times for the week have been exceptionally high, over 25 hours' dual instruction being recorded. The total hours amounted to 50 in spite of high winds on two days. Mr. Tony Weber completed his "A" licence tests. The Leopard Moth is now fitted with dual control and rates on this machine are the same as those for the Avro Cadets. The R.A.F. from North Weald and Hornchurch are co-operating with the club in the arrangements for Empire Air Day.

NEWCASTLE

The reconnaissance patrol competition is well under way and twelve members have already flown off their heats. Mr. J. Whittaker has qualified for his "A" licence, and first solos were made by Messrs. L. Trudgill, A. C. Barrett, J. F. Simpson, J. Fowler, and W. Clayton. The total time spent in the air during April came to 259 hours inclusive of cross-country flights to Belfast, Yeadon, Tranent and Carlisle. C. of A.s have been carried out by the club engineers on the Gipsy I Moth and Tiger Moth.

READING

On Whit Sunday, June 5, a bottle of champagne will be awarded to the car-owning member arriving at the nearest minute to a sealed time between two and three o'clock. A demonstration of the Monarch, the Magister and the Avro Avian fitted with tricycle undercarriage is being arranged from three to five o'clock, to be followed by a tea dance. Weather has not been good, but the machines were busy. Mrs. Howard-Jones, better known as Miss Ruth Fontes, was a visitor last week.

KARACHI

Of the cross-country flights undertaken, a trip to Bombay and back by Mr. N. B. Patel, and a trip to Delhi-Agra and back by Mr. G. Grossenbacher, deserve special mention. During April a total of 188-odd hours was done, which included 2 hr. 10 min. night flying. "A" and "B" licence candidates have been actively engaged; Messrs. P. N. Pandey and G. J. Tahilramani have passed their "A" tests, and Mr. Minwalla was successful with his "B." The ground engineering classes have been fully occupied, and no vacancies will occur for some considerable time.

NORFOLK AND NORWICH

More favourable weather conditions were prevalent and a consequent increase in the number of flying hours was evident during the week ended May 11. Enquiries are rolling in for particulars of the Fifth Public Schools' Aviation Camp which will take place at Norwich in August. Wrekin College, Wycliffe College, Cheltenham School and Bedford School are just a few who have evinced interest in the scheme, and it is anticipated that the camp will be bigger than ever. The gliding section is very popular and it is hoped that a display will be possible for Empire Air Day.

BROOKLANDS

Of the three machines which flew to Nottingham for the Dawn Patrol two got through. In the afternoon the Vega Gull was demonstrated to members. A most welcome visitor was present in the person of Lt. Col. R. Smith-Barry, who may be called father of the Royal Air Force training system of to-day. He still flies. Details of the four-club-competition have now been arranged. The teams are to consist of three members from each of four centres, Shoreham, Lympne, Sywell and Brooklands. One member of each team must be a woman pilot. The competition has been fixed for Sunday, June 19.

HULL

The report of the Hull Aero Club for the year 1937-38 is rather disappointing. A considerable drop from the previous year's figure of 1,175 hours' flying was shown in the 717 hours for this year. Instructional flying was down from 574 hours to 314 hours, due to a noticeable reduction in the number of pupils wishing to learn to fly. Solo flying was also low, with a drop of 200 hours on the previous year. A brighter thought is that damage to aircraft has been negligible. During April, 1938, 70 hr. 45 min. were flown, of which 29 hr. 30 min. were solo. Mr. Bell carried out his first solo flight and completed his "A" licence tests. A Gipsy Moth which has replaced an older Moth is proving very popular.

MADRAS

"April is the first of the hot-weather months, and consequently the air is more than ever the place to be, for up above the steaming plains the aeronaut can look down on the teeming thousands of George Town thronged together in the narrow streets and exult in the joy of flight," are the sentiments expressed by the secretary of the Madras Flying Club. "The aerodrome," he continues, "is becoming browner and the grass thinner, but it is still a marvel of smoothness." Flying during April was slightly below average, due to the absence of the instructor for a fortnight, but Flt. Lt. H. Duncanson is now in command, and the remainder of the month was actively spent in the air. On Easter Saturday and Monday a flying meeting was held, when Mr. V. Sundaram did most of the flying in the Leopard Moth. Over 500 people paid to see a Gipsy Moth which was on view.

COMMERCIAL AVIATION

THE WEEK AT CROYDON

"A. Viator's" Causerie on Airline Affairs at London's Main Terminal and Elsewhere

ONE of the evening papers last week, reporting that the Ensign had gone to Martlesham, made the illuminating comment that, as this giant airliner has a top speed of 200 m.p.h., the journey from London to Paris would take only half an hour.

The most backward child in a kindergarten devoted to infants of weak mentality would probably realise that an aeroplane does not travel at its top speed very often, and the same far from acute brain would doubtless have made a better shot at the mathematics of the case.

Naturally, I believe what I read in the newspapers, especially the evening ones, so I imagine that not only politically but even geographically Paris has recently moved much nearer to London. I wonder if Herr Henlein, who flew over from Prague and back again last week, noticed this phenomenon?

North-Eastern Airways, Ltd., obtained handsome publicity in the daily newspapers last week by bringing from Scotland some rare and vitally needed serum for a hospital case in London. Every such occasion, when life may be saved by air transport, deserves to be given full publicity, but it is no new thing for such serum to be brought from distant parts of the Continent by air for immediate use in a London hospital. Often, however, the newspapers are only mildly interested.

Aviation saved the situation in a lesser matter, too, last week when they had to change the opera at Covent Garden owing to Herr Richard Tauber developing minor throat trouble. As the great singer himself uses air transport regularly, it was probably his suggestion which caused Mme. Tiana Lemnitz and Mme. Louise Schilp to travel by air from Berlin (by Scandinavian Air Express arriving at 4.45 p.m.) and hurry to Covent Garden by car.

I am informed (but somewhat hesitantly) by those who usually know, that the Italian company which was to have come through to London about a month back will really commence operations on June 1. The service will be Venice, Milan, Turin, Paris, London, and vice versa, with connection for Rome at Milan.

Irritating

A Flying Flea was seen at Croydon a day or two back, a visitor unusual enough to cause comment. *Heracles*, on the tarmac, is believed to have hoped the little creature would not jump on his back, as he was not prepared to start Mayo-composite stunts at his time of life. *Scylla*, on the other hand, hoped the thing would not bite him under the chin, for he could not, like some of these new-fangled machines, lift one leg of his undercarriage and scratch himself.

Imperial Airways have started a new and attractive cheap return ticket system on the London-Paris line. Leaving Croydon Monday, Tuesday or Wednesday and returning Wednesday, Thursday or Friday, the fare is to be £6 6s. instead of £7 10s.

The K.L.M. and K.N.I.L.M. combined service right through to Australia is to come into operation sooner than many people expected. The first machine to give through connection between London and Darwin, Cloncurry, Longreach, Brisbane and Sydney will leave Croydon late in the evening of Monday, June 27, and the outward trip will be one of 8 days whereas inwards Sydney-London will be 7½ days.

Times of arrival in the Australian cities are all early in the day. For example, it will be possible to continue to Melbourne the same day by Australian National Airways, from Sydney. Adelaide can also be reached on the second day from Sydney, by making use of the Australian National Airways, the Guinea Airways or Ansett Airways connections.

DELIVERED: A pleasantly informal snap from Hatfield, showing Aero O/Y pilots taking delivery of their Company's second D.H. Rapide. Left to right: Mr. Peter de Havilland, Flt. Capt. Raunio, W/O Nylund, Mr. Geoffrey de Havilland and Mr. George Gibbons.

From England down to Batavia K.L.M. Douglas D.C.3s will be used as in the past, whilst a K.N.I.L.M. Lockheed Super Electra will do the Batavia-Australia section.

Fares to Darwin, Cloncurry, Longreach and Brisbane are, curiously enough, all the same, viz., £160 single and £288 return. To Sydney the single fare is £165 10s., or £297 18s. return.

Incidentally I see in a brochure a table giving the approximate cost of sea and air travel from London to Alexandria, Baghdad, Calcutta and Singapore and then home again, for a business executive. Taking travel time as unproductive to the employer, nine weeks as a minimum has to be paid for, when the employer travels by sea, as against two weeks only by air, and there are any amount of extras in surface travel which do not exist when travelling the air way; so, on the whole, it is some £20 cheaper to fly than to bucket around in boats and trains.

One of the senior commanders of Imperial Airways, Capt. L. A. Egglesfield, has just completed 250,000 miles of flying on the Empire routes. Another bit of news is that rumours went around Croydon of a "new" senior Captain of Imperial Airways, who had never been seen before. It did not seem possible, but rumour was persistent. In the end it proved to be Capt. O. P. Jones without the well-known beard. Several other beards have appeared on what used to be familiar faces, which may be the reason why O. P. Jones has discarded his.

A certain air transport company's publicity officer has issued an epoch-making announcement to all news editors to the effect that on certain of the company's routes modern multi-engined air liners with a cruising speed of 130 m.p.h. (no less) will be used.

What an age of progress we do live in, to be sure! Why, it's not impossible that this publicity officer may live to see the day some twenty years ahead when cruising speeds may be as high as the incredible rate of 200 to 250 m.p.h. and he may be in the proud position of announcing that his company is actually contemplating the purchase of modern multi-engined air liners cruising at 230 m.p.h.

COMMERCIAL AVIATION (CONTINUED)

Bermuda-bound

TO manage the Bermuda and New York services on behalf of Imperial Airways, Capt. J. G. Powell, accompanied by his wife and son, sailed from Liverpool on Thursday in the P.S.N.C. liner *Orduna* for Bermuda.

The Future of Dyce

SAFEGUARDING of the interests of civil aviation at Dyce Aerodrome, Aberdeen, is assured, according to a statement made at a meeting of Aberdeen Town Council on May 5.

The council some time ago declined to negotiate for the purchase of the aerodrome and subsequently inquiries with a view to purchase were made on behalf of the Air Ministry. The city treasurer recently interviewed the Ministry in London and as a result an assurance was given that such facilities as are at present enjoyed will be continued.

Swedish Mail Expansion

THE night mail service from Sweden to the Continent operated by the A.B. Aerotransport, has now been extended to six nights a week against five before, Sunday night being the only one without a run.

At the recent Postal Conference in Stockholm it was resolved, *inter alia*, that the night air-mail services from Scandinavia and the rest of Europe shall continue to follow the present programme at least for a year.

Peace at Renfrew

IT appears that peace, or at least a three-year armistice, has been declared on the Renfrew front.

It will be remembered that Renfrew Airport was due to be closed down on Sunday by the Renfrew Town Council, who had publicly alleged that they were unable to obtain any co-operation from the Air Ministry, or even to secure any attention to repeated letters.

Mr. A. H. Wilson, Assistant Director, Directorate of Civil Aviation, and Mr. F. W. Hancock, of the Department of the Director-General of Civil Aviation, visited Renfrew on Tuesday of last week and met Major D. K. Michie, Provost of Renfrew, Mr. David Robertson (town clerk), and the airport committee of the Scottish Flying Club.

It is understood that, as a result of the conference, the transport companies using the airport will secure a three-year guarantee of tenure, and that the Scottish Flying Club will be given a further lease for five years.

Speed of the Scion

IN the review of commercial aircraft in our Commercial Aircraft and Airlines Number the speed of the two-Pobjoy-engined Short Scion was given, by a printer's error, as 100 m.p.h.; this should, of course, have been 116 m.p.h.

A few of the visiting machines on the tarmac at Helsingfors Airport last Sunday, with a view of the car park and new terminal building on the right. The machine on the left is the L.O.T. Lockheed 14, while in the foreground, just to be seen, is one of the Aero O/Y. two Rapides.

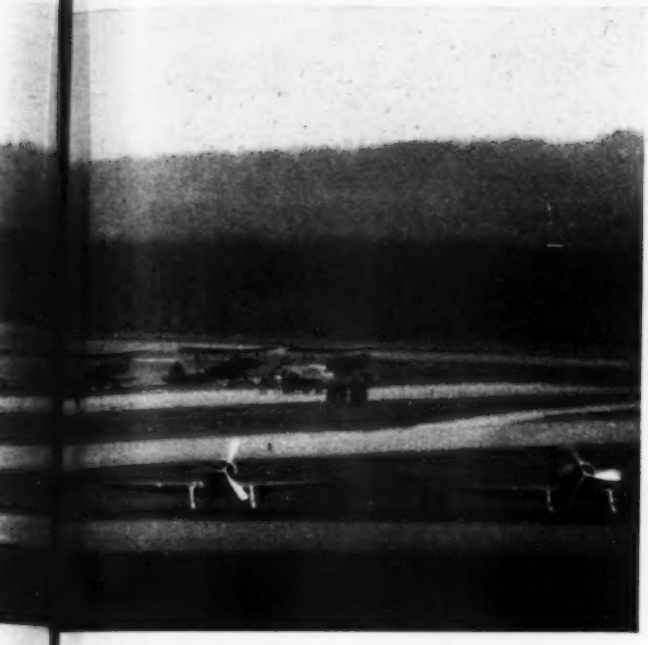
At the Helsingfors Airport opening. Lt. Viisapää (left), the chief of inversion wit

TERMINA

Helsingfors Airport is Offici

A COUNTRY geographically and financially disposed in the way in which Finland is can expect useful and educated support on the occasion of the official opening of its capital's airport. Nevertheless, the number of machines which visited Helsingfors for last Sunday's opening was quite remarkable, and among them were types as new and as little seen as the Lockheed 14. The display put up by the Finnish Air Force, by local talent generally and by visiting pilots, was of the very best.

After the official speeches and ceremony two sailplanes were aero-towed to a considerable height in the windy and obviously



...the Finnish State Aircraft Factory is seen above in a low-down state ...iima trainer.

...r FINLAND

...ened: *Display and Demonstration*

bumpy conditions, and while one of them lost height fairly rapidly in a series of aerobatics, the other was kept in the air for as long a period as thermal and other conditions permitted. Thereafter two primary trainers were winch-launched to a height at which no such type is ever seen in this country. All the pilots made the airport in spite of the strong wind and, in fact, managed to pull off quite creditable spot landings. The idea of thus, by way of a preliminary to the more serious demonstrations, showing aviation in its motorless beginnings was a good one. At a later stage in the afternoon the simple evolutions would have been watched with bored indifference.

This exhibition was followed by one put up by the Finnish Air Force, three Fokker C.10s sesquiplanes diving on the crowd. The piercing sound emitted by the fixed-pitch airscrews running at an inefficiently high rate no doubt gave the crowd an impression of speed denied them by the silent Fokker D.21 fighters, which were travelling quite a hundred miles an hour faster with controllable-pitch airscrews. For some reason or other none of the batch of Bristol Blenheims used by the Finnish Air Force put in an appearance, but one of their three Ansons flew past and made a couple of smoothly accurate loops.

Local design, constructional and piloting talent were adequately displayed by Lt. Viisapää, the chief test pilot of the State Aircraft Factory, who carried out a magnificent series of low-altitude aerobatic manœuvres, including outside loops and inverted flying, in a Finnish-built Viima biplane which has been designed for primary training. His performance was in every way equal to, and possibly safer than, the much admired shows now being put up by two or three crack German pilots. His offering was, in fact, only equalled at this meeting by the German pilot of a Klemm 35.

British Contribution

The only English type to be officially displayed was the latest Dragon Rapide which, after floating about near the stall for five minutes in the hinterland in order to "kill" his port engine, was brought in by Mr. Buckingham with one airscrew kicking round little by little, and he thereafter proceeded to do single-engined turns in each direction before a final display of full-powered speed and manœuvrability. Although not actually in the programme for demonstration flying, one of the most interesting fly-pasts was that made by the Polish L.O.T. Lockheed 14, which has only very recently been delivered to the company and which was brought over specially for the opening ceremony. It was significant, perhaps, that the pilot did not use the Fowler flaps for take-off. Perhaps it was merely that the machine was too lightly loaded to make their use worth while. Another expected 14, the first of K.L.M.'s fleet of these machines, was not able to come over. The only German type of comparatively new design to be flown was the Focke-Wulf Weihe, a twin-engined trainer, the pilot of which showed adequately that it was both fast and manœuvrable.

Among the visitors was a British Airways Electra, flown by Cdr. Pelly, which returned to Stockholm that afternoon. This machine had arrived at Stockholm on the ordinary service on Saturday and had simply been flown on to Helsingfors before returning for its scheduled run on Monday.

The interest shown by the Finnish people both in the flying itself and in the airport was indicated by the quite considerable crowd in and about the terminal building.

The airport itself has been in use for rather more than a year, and when the personnel is transferred from the offices built into the main hangar to the new terminal building, Helsingfors will have one of the best-equipped airports in Europe. We hope to describe and illustrate some of its salient features in due course.

"*Flight*" photographs.

HERE and THERE

Recent Happenings and Forthcoming Events in the Aeronautical World

Mr. Stanley Evans

CONGRATULATIONS to Mr. Stanley H. Evans, B.Sc., M.I.Ae.E., A.F.R.Ae.S., A.F.I.Ae.S., on his appointment as Director of Engineering at the Ryan School of Aeronautics, San Diego, California.

Mr. Evans, whose aviation experience is a long one, and includes Service flying during the War, has been in the design offices of several well-known companies, including Koolhoven and Gloster, but he will be chiefly remembered in this country for his association with the Heston Phœnix and his predilection for designs that are unusually pleasing to the eye. This is not Mr. Evans' first visit to the States; some years ago he directed the Curtiss-Wright School.

Mr. Stanley Evans, who, as related here, has been appointed to a post with the Ryan School of Aeronautics, California.

R.Ae.C. Official Notices

INTERNATIONAL Air Rally, Belgium.—The Golden River Aviation Club, Courtrai, are organising an international rally on July 29-August 1, to mark the inauguration of the Queen Astrid Memorial by H.R.H. Prince Charles of Belgium.

Invitations are extended to the pilot and one passenger per aircraft, who will be the guests of the Golden River Aviation Club so far as hotel accommodation, meals, etc., are concerned.

A very attractive programme of festivities has been arranged, and British air tourists wishing to take part should send in their names to the Royal Aero Club as early as possible, and in any case not later than May 30. Early application should be made as the number of invitations is limited.

Aalborg Airport.—The inauguration of the new Aalborg Airport, at Rödslet, Denmark, will take place on Sunday, May 29, at 2 p.m.

The Aalborg Town Council issue an invitation to members of the Royal Aero Club to take part in the meeting. Pilots will be the guests of the Town Council from May 28-30. The Council will also pay to each pilot Kr.75 towards petrol.

Members wishing to take part are requested to notify the Club not later than May 19.

Dutch Aerobatic Championship.—The Noord Nederlandsche Aero Club is holding an aerobatic meeting at Eelde, near Groningen, at Whitsuntide. Full particulars of the competition may be obtained from the Royal Aero Club.

WALK UP! Entries at ordinary fees for the Whitsuntide Isle of Man Air Races must be in the hands of Capt. Stocken (109, Jermyn Street, London, S.W.1.) by next Saturday, May 21. Above are the two principal awards.

Captain Robert Sutherland Rattray

THE life of Capt. Robert Rattray, who was killed on Saturday in a gliding accident, was one more than usually full of interest. He served in the Boer War, after which he became a professional big-game hunter and an authority on Ashanti law and languages. During the Great War he acted as a scout to the British Forces in West Africa, blew up a railway bridge and killed the crew of an enemy train single-handed, then hid in the grass while the load of soldiers were hunting for him with bayonets. For his services he received the O.B.E.

After the War he continued in Africa in the Civil Service, and during his leave he became a barrister, learnt to fly, and flew back to the Gold Coast in his Moth, experiencing more adventures, which included the necessity of repairing a fractured spar with pieces of soap box. For the survey work he did on this flight he was given the C.B.E.

When he retired, he started lecturing on the two Ashanti languages at Oxford University and took up ski-ing and gliding. With his usual perseverance, he soon became one of England's foremost sailplane pilots.

On Saturday he was flying at the Oxford Club, which he had lately founded. He had just been winch-launched when he made a rather shaky circle; then the elevator was seen to go down, and the sailplane dived into the ground, hitting beyond the vertical. There appeared to be no question of mechanical failure of any sort. Capt. Rattray had complained of a headache before going up, and it was thought that he fainted and fell on the stick.

His loss will be a great one to the British gliding movement and to all the friends that he had made there.

Forthcoming Events

May 14-22. Finnish Aero Show, Helsinki.
May 26. Royal Aeronautical Society: Wilbur Wright Lecture: "Materials in Aircraft Construction," by Dr. H. J. Gough. Institution of Mechanical Engineers, 6.30 p.m.
May 28. Air League of the British Empire: Empire Air Day
May 28-June 13. Belgrade Aero Show, Yugoslavia.
May 29. Opening of Aalborg Airport, Rödslet, Denmark.
June 4-6. Manx Air Races.
June 11. Bristol and Wessex Aeroplane Club: Garden Party.
June 18 and 19. Brooklands Four-club "At Home."
June 22-28. F.A.I. Conference, Berlin.
June 25. Official opening of Wolverhampton Airport.
June 25. Air Display, Gatwick Airport.
June 25-July 1. Magyar Pilota Picnic, Budapest.
June 30. Aero Golfing Society: Jubilee Cup, Prince's, Sandwich.
July 2. R.Ae.C.: King's Cup Race.
July 9. Ipswich Aero Club: Flying Meeting.
July 9-17. National Gliding Contests, Dunstable.
July 16-18. Deauville Rally.
July 16. Official opening of Luton Municipal Aerodrome by Secretary of State for Air.
July 17-24. Third Littorio Rally, Italy.
July 23. County Flying Club: Flying Meeting at Rearsby, Leicester.
July 29-August 1. Courtrai Rally, Belgium.
July 30. Official opening of Exeter Airport.
July 30. Folkestone Aero Trophy Race, Lympne.
August 27-28. Southend Flying Club: Flying Meeting.
September 3. Cinque Ports Wakefield Cup Race, Lympne.
September 10. Cardiff Aeroplane Club: London-Cardiff Race.
September 11-18. Swedish Civil Aviation Week, Stockholm.
September 21. Aero Golfing Society: Cellon Trophy Richmond Golf Club.
November 18-December 4. Paris Aero Show.

HERE AND THERE (CONTINUED)

The Ministerial Changes

THE Ministerial changes announced last Tuesday, and on which we comment on page 481, may be briefly summarised as follows in respect of those connected with aeronautical affairs.

Lord Swinton resigns from the post of Air Minister, and is succeeded by Sir Kingsley Wood.

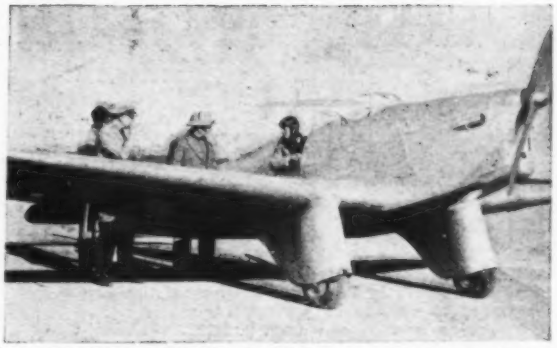
Lt.-Col. Muirhead, M.C., resigns from the post of Under-Secretary for Air to become Under-Secretary for India. He is succeeded by Capt. Harold Balfour, M.C.

Lord Weir, who has acted as adviser to the Air Ministry and Committee of Imperial Defence, resigns from the Air Council.

Compact Switchgear

A NEW item of equipment manufactured by the Burgess Products Co., Ltd., of Barwell, Leicester, has received Air Ministry approval for use on all types of aircraft. It is a snap-action electric switch known as the Burgess Micro-switch, and it is capable of operation as a " make," " break," "double throw," " double-contact make," or " single-contact break and double-contact make."

The switchgear forms a complete unit, which is removable and replaceable without interference with the wiring, and which can be sealed so that it is waterproof and gasproof.



THIS MILES HAWK TRAINER, completed recently, is claimed to be the first aeroplane to be assembled and partly built in India. It was built by the Aeronautical Training Centre of India under licence granted by Phillips and Powis Aircraft through their agents for India, R. K. Dundas, Ltd., of New Delhi and Portsmouth.

Operation is by a central press button. Contacts are of pure silver, and the switch can be used on A.C. up to 3 kW. and, with a suitable condenser, on D.C. up to 2 kW. The outside dimensions of the switch box are 2⅝in. by 1⅝in. by 2 1/16in.

"SCHEME L"

(*Continued from page 492*)

both buyer and seller. Was it, he asked, possible that that was where the obstruction came from?

MR. MCENTEE pointed out that Russia was making aeroplanes almost entirely of wood, and Italy was producing aeroplanes partly of wood and partly of metal which had given the utmost satisfaction. During the war the woods in general use were English ash and silver spruce. Spruce was imported, but English ash was not. There was no shortage of English ash at the present time. There was no shortage of silver spruce. But even if there were a shortage of either of these woods, there was on the market to-day laminated wood, which had reached such a stage of perfection that there was no question about its suitability for wooden aeroplanes. There was no shortage of labour. There were 500 members of the Amalgamated Society of Woodworkers out of work, many of them having experience in aircraft production. In addition, there were thousands of cabinet-makers and other wood workers who would be competent to make aeroplanes with practically no training at all.

LT. COL. MOORE-BRABAZON said his Noble Friend, the Member for Horsham (Earl Winterton), was appointed to clean the Augean stables. He turned out to be, with his electrical personality, a modern Hercules with a Hoover! He also stressed the possibility of building aircraft in Canada. If we manufacture in our great Dominions, the brains of the aircraft industry would remain in this country, as the Dominions would do the construction and we should do the designing.

MR. ARTHUR SALTER complained that Earl Winterton had not told them, he did not dare tell them, how far our position fell behind that of our principal competitor. The case for a Ministry of Supply did not depend on criticisms of the Air Ministry, and no possible change of personnel in the Air Ministry could destroy their case for a Ministry of Supply. He suggested that what was wrong was the complete lack of a proper sense of proportion in the whole of our defence programme arrangements. He thought our vulnerability to air attack was for us by far the most important fact in the world at this moment.

MR. PATRICK said it was the duty of the Government to make an effort and the duty of all to back that effort. Criticism was necessary, but there should be nothing in the way of recrimination. It would be a most profound mistake, profound lack of common sense, if we allowed party feeling, engendered perhaps by events abroad, to prevent unity.

MR. PERKINS pointed out that, accepting Earl Winterton's figures, we should in 1940 be building 600 aeroplanes a month. Germany was now building about 350 aeroplanes a month, but she would not remain idle during the next three or four years. By 1940 Germany would have increased her output from 350 to about 1,200 machines a month. If those figures were anywhere near the mark, then in two years' time we should be in the same parity position as we were to-day. Mr. Perkins suggested that the Air Ministry should provide an area committees which would have the power to override both the technical authorities at the Air Ministry and the A.I.D. If a manufacturer found that he was being held up, he would have a Court of Appeal to which he could go for a quick decision. He thought our factories in this country, and particularly our engine factories, were at the mercy of any hostile enemy force in Europe. He thought that they could be knocked out in the first 24 hours of war, and that meant that we should quickly lose control of the air and be defeated. Surely the right policy to adopt was to start new factories in Canada, Australia and South Africa. He concluded by saying that he would like to see a purely private enquiry set up, consisting of three or four business people, with the idea of putting forward constructive suggestions for the future.

MR. WAKEFIELD said the debate had dealt almost entirely with mass production of aeroplanes. It was his opinion that if war broke out the real difficulty would be in regard to trained pilots. The losses of pilots immediately on the outbreak of hostilities would be very great. Machines lost could be replaced in a few weeks, but skilled pilots could not be replaced in a few weeks. He thought they ought to be careful not to lose their sense of proportion in going in for rapid production of machines. He knew at present they had more pilots than they had machines for them to fly, but every effort ought to be made to give the fine reserve of pilots opportunities of flying up-to-date modern machines.

WORK OF THE ROYAL AIR FORCE

Special Number of "FLIGHT" next week.

APPROPRIATELY appearing two days before Empire Air Day, which this year takes the place of the R.A.F. Display, next Thursday's issue of FLIGHT is a Special

ROYAL AIR FORCE NUMBER.

This enlarged issue will contain special articles reviewing the work of the R.A.F. at home and abroad. The organisation and constitution of the Service will be explained, and the daily flying duties and life of typical units will be related by writers who have shared in them. On the equipment side modern Service aircraft and engines will be described, and there will be some notable illustrations. Another article will offer advice to those contemplating a Royal Air Force career. A guide to the various Empire Air Day displays will also be included.

NEXT THURSDAY — FLIGHT — MAY 26

THE INDUSTRY

Stream-line Filters, Ltd.

AN increase in profits to £23,805 is shown in the accounts of Stream-Line Filters, Ltd., for 1937, as compared with £16,568 for previous nine months. A final dividend of 12½ per cent. is declared, making 20 per cent. for the year.

Aircraft and Cars

OPERATING at the aerodrome at Hamley Green, near Warlingham, Surrey, the Southern Motor and Aircraft Co. not only recondition and deal in aircraft, but also have a department specialising in the sale of rebuilt Rolls-Royce cars; models of 1926-1930 vintage are reconditioned, fitted with bodies of an ultra-modern type, and sold at prices ranging from £450.

H.P. Pensions Scheme

HANDLEY PAGE, Ltd., recently announced a staff pension and assurance scheme, operated in conjunction with the Eagle Star Company. In addition to the usual benefits, the H.P. Company is also paying the entire cost of pensions for past service and certain additional pensions. These last ensure that workers who are too old to have pensions of a minimum of £26 at retirement age will have their pensions brought up to that amount at the Company's expense.

The Modern Way

CALLENDER'S Cable and Construction Co., Ltd., who are world-famed as makers of electric cable, and who have recently more fully entered the aeronautical world as erectors of the Callender-Hamilton hangars, make considerable use of aircraft in their business.

Two members of the engineering staff, Flt. Lt. E. R. Meads and Mr. C. O. Boyse, are qualified pilots, and both are frequently employed on flying colleagues to various parts of the country in connection with Callender activities. The machines are chartered from Air Hire, Ltd., at Heston.

New Motors for Old

"ARE your motors out of date?" asks a leaflet recently issued by Brook Motors, Ltd., of Empress Works, Huddersfield. It contains details of a scheme whereby these well-known makers of works power equipment offer up to a maximum of fifty per cent. discount off the price of new machines in exchange for existing motors.

Incidentally, the very informative pocket reference book *Installations and Maintenance of Electric Motors*, issued last year by Brook Motors, now appears in a new 150-page edition, the two main sections, "H.P. Required to Drive Machinery" and "Installation and Maintenance," having been doubled in length and a new set of data sheets added. The price is 1s. post free.

PUBLICATIONS RECEIVED

Jahrbuch 1937 *Der Deutschen Luftfahrtforschung*, RM.80, R. Oldenbourg Schliessfach 31, Munich, Germany.

Handbook of the Bristol Mercury Aircooled Radial Engines, Types VII, VIII and IX, £3 3s. Bristol Aeroplane Co., Ltd., Filton, Bristol.

Leaflets: The Newall Jig-Borer. E. H. Jones (Machine Tools) Ltd., Edgware Road, The Hyde, London, N.W.9.

Les Flottes de L'Air en 1937 by Robert Gruss, 45fr. Société d'Editions Geographiques, Maritimes et Coloniales, 17 Rue Jacob, Paris, France.

Rugby Engineering Society: Proceedings, 1935-6. Vol. XXX. 10s. 6d. *Proceedings*, 1936-7. Vol. XXXI. 10s. 6d. Published by the Society at Rugby.

Airworthiness Handbook for Civil Aircraft, Vol. I, Design Section. 7s. 6d. H.M. Stationery Office.

A Passport Round the World, by C. H. Holmes; 12s. 6d., Hutchinson and Co. (Publishers) Ltd., 34, Paternoster Row, London, E.C.4.

Gids Voor Luchtvarenden Nederland, price Fl. 3.50. Rijksuitgeverij Dienst van de Nederlandsche Staatscourant

Night Hawk, by J. Railton Holden; 7s. 6d., George Newnes Ltd., Southampton Street, Strand, London, W.C.2.

Sir Alan Cobham's Book of the Air; 5s., Blackie and Son, Ltd., 50, Old Bailey, London, E.C.4.

Kameradschaft der Luft: Festschrift Anlässlich des Fünfzigsten Geburtstages, by Dr.-Ing. Ernst Heinkel, Wiking Verlag, Berlin, Germany.

Solo, by Nicolas Bodington; 7s. 6d., Victor Gollancz, Ltd., 14, Henrietta Street, Covent Garden, London, W.C.2.

There's a Devil in the Drum, by John Lucy; 8s. 6d., Faber and Faber, Ltd., 24, Russell Square, London, W.C.1.

The Unending Conquest, by Prof. R. de la Bère; 1s. 4d., J. M. Dent & Sons, Ltd., Aldine House, Bedford Street, London, W.C.2.

The "Girl" Calendar, April, 1938–March, 1939; Metropolitan Vickers Electrical Co., Ltd., Trafford Park, Manchester, 17.

The Complete Model Aircraft Manual, by E. T. Hamilton; 12s. 6d., John Lane The Bodley Head, Ltd., Bury Street, London, W.C.1.

Women with Wings, by Pauline Gower; 10s. 6d., John Long, Ltd., 34, Paternoster Row, London, E.C.4.

Trade Notes and News

MR. PETER BENNETT, O.B.E., J.P., the new president of the Federation of British Industries. He is joint managing director of Joseph Lucas, Ltd., and its associated companies, among which is Rotax, of aeronautical electrical fame.

INCREASES OF CAPITAL

SARO LAMINATED WOOD PRODUCTS LTD. (Kingsway, London, W.C.2).—The nominal capital has been increased by the addition of £104,900 beyond the registered capital of £100. The additional capital is divided into 419,600 ordinary shares of 5s. The company has now been converted into a public one. Part of the above increase is for the purpose of acquiring the undertaking and assets of Laminated Wood Products, Ltd., and that part of the business of Saunders-Roe, Ltd., relating to the manufacture and sale or distribution of plywood and laminated wood and the products thereof. The directors are: Alfred E. Chambers, Harold H. Balfour, Edwd. D. Clarke and John. de C. Ballardie (all directors of Saunders-Roe, Ltd.), and Wm. A. Radley, Bertram F. Miskin and Arthur H. Scroggs (all directors of Laminated Wood Products, Ltd.).

SOUTHEND FLYING CLUB LTD. (The Aerodrome, Southend-on-Sea).—The nominal capital has been increased by the addition of £1,900 in £1 preference shares, beyond the registered capital of £100.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

LINDSAY NEALE AVIATION, LTD.—Private company, registered May 6. Capital, £1,000 in 1,000 shares of £1 each. Objects: To adopt an agreement with R. Lindsay Neale, and to manufacture and deal in aeroplanes, flying boats, seaplanes, etc. The directors are: Robert Lindsay Neale, aeronautical consultant (permanent director and chairman); Miss Rosemary W. Pewtress; Bernard L. Pewtress; Cyril H. Temple. Solicitors: Parkers and Hammond, 39/41, New Broad Street London, E.C.2.

FORGINGS & PRESSWORK (BIRMINGHAM), LTD.—Private company, registered May 7. Capital, £100 in 100 shares of £1 each. Objects: To carry on the business of manufacturers of drop stampings and forgings, parts of cycles, motors, aeroplanes, etc. The first directors are to be appointed by the subscribers. Solicitors: Roland Hollick and Co., Coventry.

CHANGE OF NAME

MESSIER AVIATION ENGINEERING COMPANY, LTD. (34, Bishopsgate, London, E.C.2).—Name changed to Aeronautical and Mechanical Inventions, Ltd. on April 14, 1938.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

(Published April 14, 1938.)

20646. TELEFUNKEN GES. FUR DRAHT-LOSE TELEGRAPHIE: Radio direction finding systems (482,101).
2128. SPERRY GYROSCOPE CO., INC.: Automatic steering-gear for aircraft (482,333).
3948. SPERRY GYROSCOPE CO., INC.: Automatic steering-gear for aircraft (482,187).

(Published April 28, 1938.)

18123. BENDIX AVIATION CORPORATION: Illumination of dials of instruments and other surfaces (482,595).
26406. BROWN, C., and AMAL, LTD: Carburetters for internal-combustion engines (482,443).
26388. BRISTOL AEROPLANE CO., LTD., FEDDEN, A. H. R., and ANDERSON, G. O: Means for controlling internal combustion engines of aircraft (482,441).
26439. ELLIOTT, A. G., RUBBRA, A. A., and FAIRHURST, L. G.: Variable-pitch airscrews (482,377).
26675. SCHIMANEK, E.: Automatic limiting of the filling of aircraft motor cylinders. (482,716).
26681. HEFELE, E. J.: Radio direction finders (482,717).
26824. FISCHER, G. A., and MANCINI, J.: Aircraft (482, 722).
26993. AERO ENGINES, LTD., and HALLIDAY, G. F.: Control systems for supercharged aero and like engines (482,596).
32544. SIEMENS APPARATE UND MASCHINEN GES: Gyroscopic apparatus (482,388.
34445. FAIREY AVIATION CO., LTD., and FORSYTH, A. G.: Wire-gauge filters and the like. (482,622).
35565. HALL, F. H.: Aeroplane retractable undercarriages (482,474).
3995. MAIGRET, A. L. E.: Sealed shelters, notably those for protection against aerial or other bombardments. (482,542).
17720. KLEMM, H.: Monospar cantilever aircraft wing (482,488.)

(Published May 5, 1938.)

18736. SPERRY GYROSCOPE CO., INC.: Electric systems for controlling the position of a controlled object (482,879).
27173. DRIVER, R. H., and SHARE, J. B.: Aircraft (483,043).
27417. BACK, W. E.: Model aeroplanes or gliders (483,018).
27480. MARTIN, J.: Cowling and air-intake for power units of aircraft (483,055).
8839. BRODEAU, A. H. J.: Construction of wings for aircraft (482,782).
9650. VEREINIGTE DEUTSCHE METALLWERKE AKT.-GES., and FAUDI, F.: Shock-absorbing struts for aircraft landing gear (482,985).
13584. ELEKTRONMETALL GES.: Wheels for aircraft (482,791).
15537. HULSWIT, J. P.: Aerial bombs (482,927).
19626. OESTERREICHISCH UNGARISCHE OPTISCHE ANSTALT C.P. GOERZ GES., and RAABER, H.: Sighting devices for dropping objects from aircraft (482,800).

THE AIRCRAFT ENGINEER

No. 148. (Volume XVI No. 5) 13th Year May 19, 1938.

QUANTITY PRODUCTION AT FILTON

How the Bristol Blenheims Are Erected

Illustrated mainly with "Flight" photographs.

THE production in quantities of a modern military aircraft may be said to divide itself naturally into two stages: the fabrication of the individual pieces and components, and the erecting of these components into the complete aircraft. With the extensive use of stamping and pressing which the magnitude of present-day orders has made possible, the former stage is not usually the one which causes the production engineer's hair to turn grey prematurely. The delays are far more likely to occur in the second or erecting stage.

No mention may be made of the actual number of Blenheim medium bombers already delivered to squadrons of the R.A.F. by the Bristol Aeroplane Co., Ltd., but it is common knowledge that the number is very considerable. This fact, coupled with the exceptionally high performance of the Blenheim (280 m.p.h. or more at 15,000ft.) lends particular interest to the assembly methods employed at the Filton works. Space does not permit us to deal here with the initial manufacturing processes, but, as mentioned above, it is the assembly period which is the real "bottle-neck" of production.

Without going into a detail description of the construction of the Blenheim, it is necessary to point out that the fuselage is of the semi-monocoque type, with a skeleton of formers and stringers covered with light metal sheet, while the wing is a cantilever of the two-spar stressed-skin type.

It may be recollected that some years ago Mr. H. J. Pollard, now in charge of Blenheim production, referred in one of his articles in *The Aircraft Engineer* to the subject of "developable surfaces." The term was used to describe an external form of fuselage or other aircraft component which, although tapering, had no double curvature. By avoiding the double curvature the metal sheet used for the covering can be applied in large panels without necessitating panel beating or other methods of shaping, and can, in fact, be "wrapped" around the fuselage. In the Blenheim fuselage use has been made of developable surfaces, and the sheets are quite large, but, of course, reinforced by internal stringers.

Simplification

The rear fuselage portion (Fig. 1) is built as a unit on special jigs and it might be mentioned here that the Blenheim construction is slightly unusual in that the Omega-section stringers are not attached to the formers, into which they are notched, except via the outer skin. This system results in a considerable saving of work, and has been found quite satisfactory. The stringers, by the way, have their closed side riveted to the skin, the edges being free.

When the front fuselage portions leave the jigs on which they are assembled they are passed to the bottom of the erection line and mounted on trestles, as shown in Fig. 2.

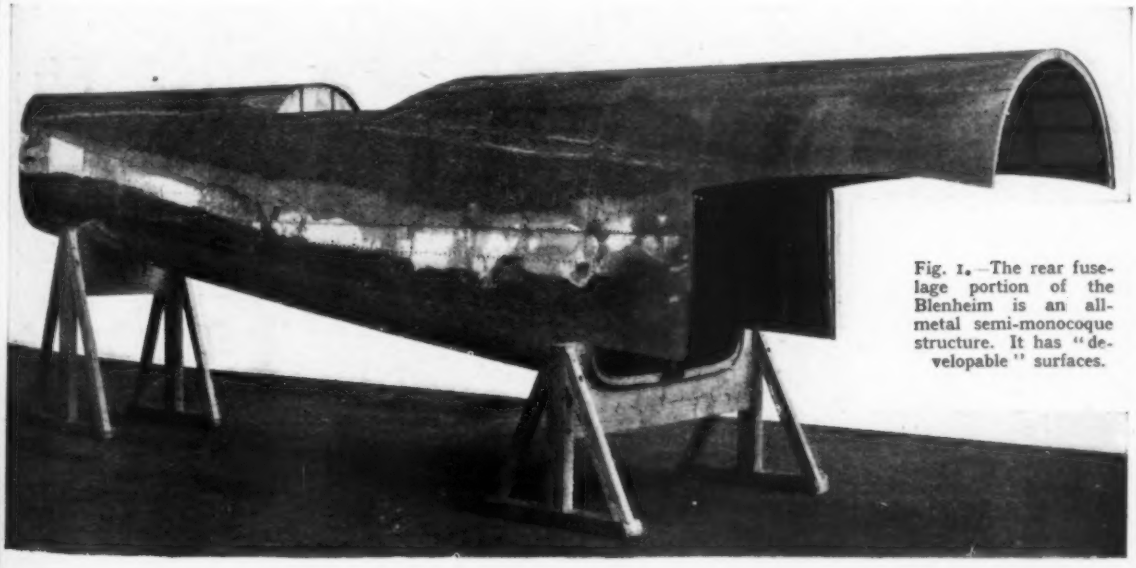


Fig. 1.—The rear fuselage portion of the Blenheim is an all-metal semi-monocoque structure. It has "developable" surfaces.

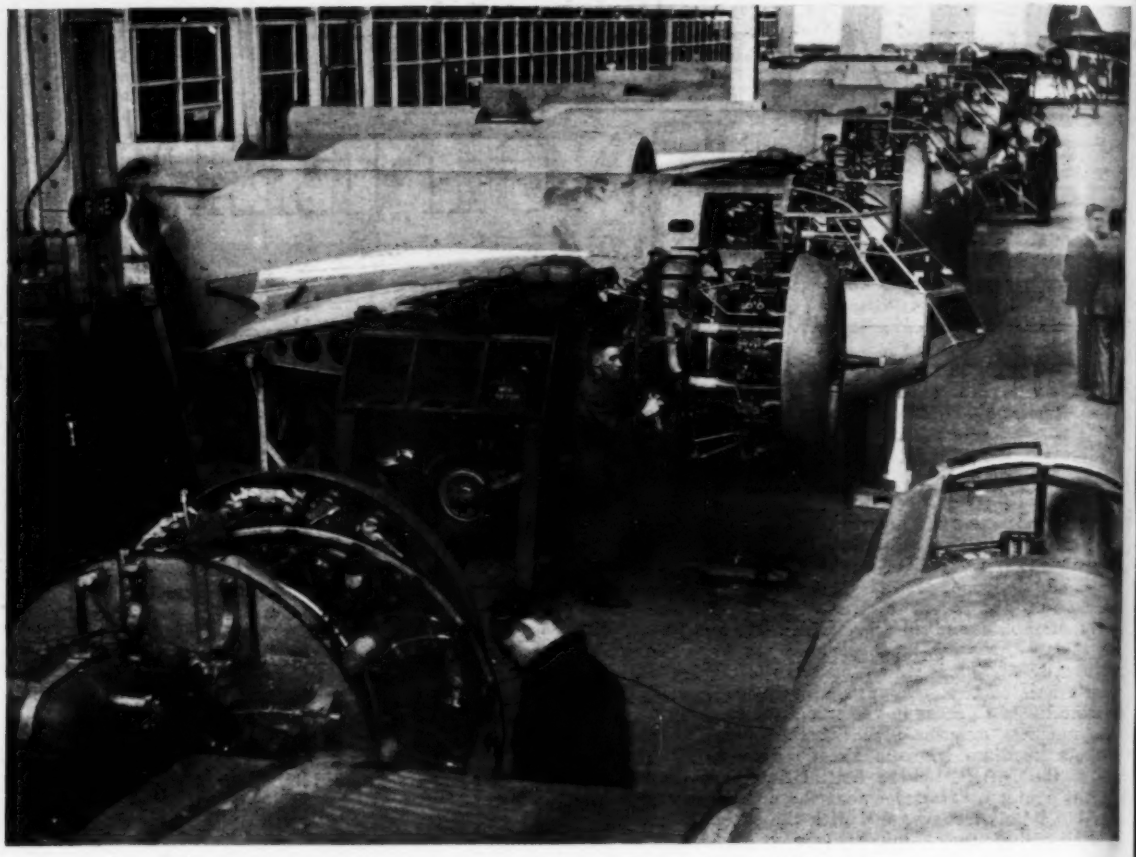


Fig. 2.—Blenheim fuselages, with engines mounted, on the production line.

for the installation of equipment, controls, etc. The various operations are divided into groups to facilitate collection and fitting of details. A group or series of groups of the assembly operation on each fuselage is allocated to each gang of men, and the method of limiting the range of work handled by any one section enables a high order of efficiency to be attained, as the men soon become specialists in their particular work.

As the fuselage travels up the line it passes through the hands of the operators who fit seats and floors, flying con-

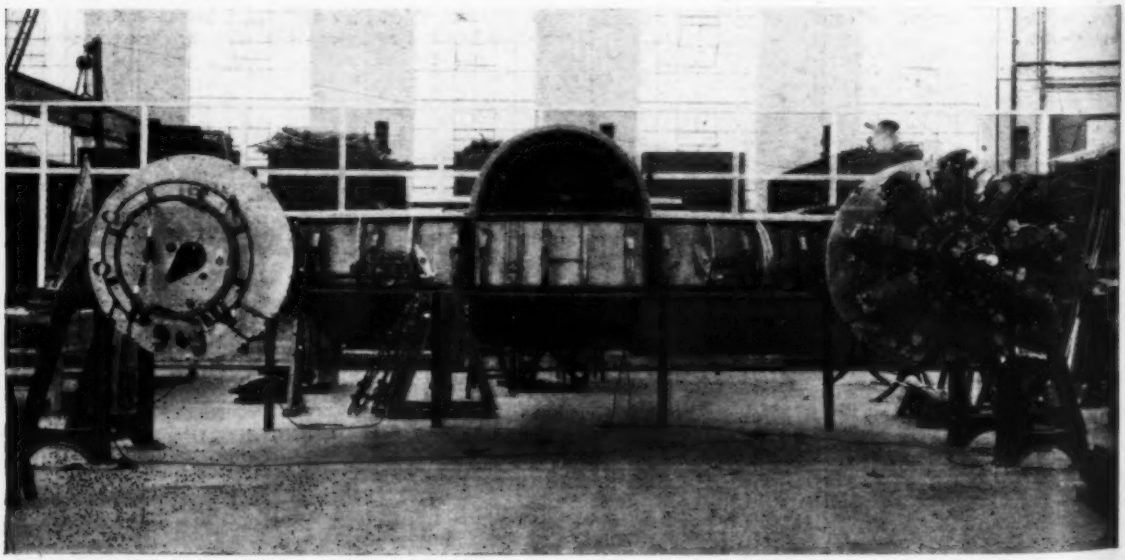


Fig. 3.—The centre-section in its special erection jig, with one engine and one engine mounting fitted, and the rear fuselage portion attached.

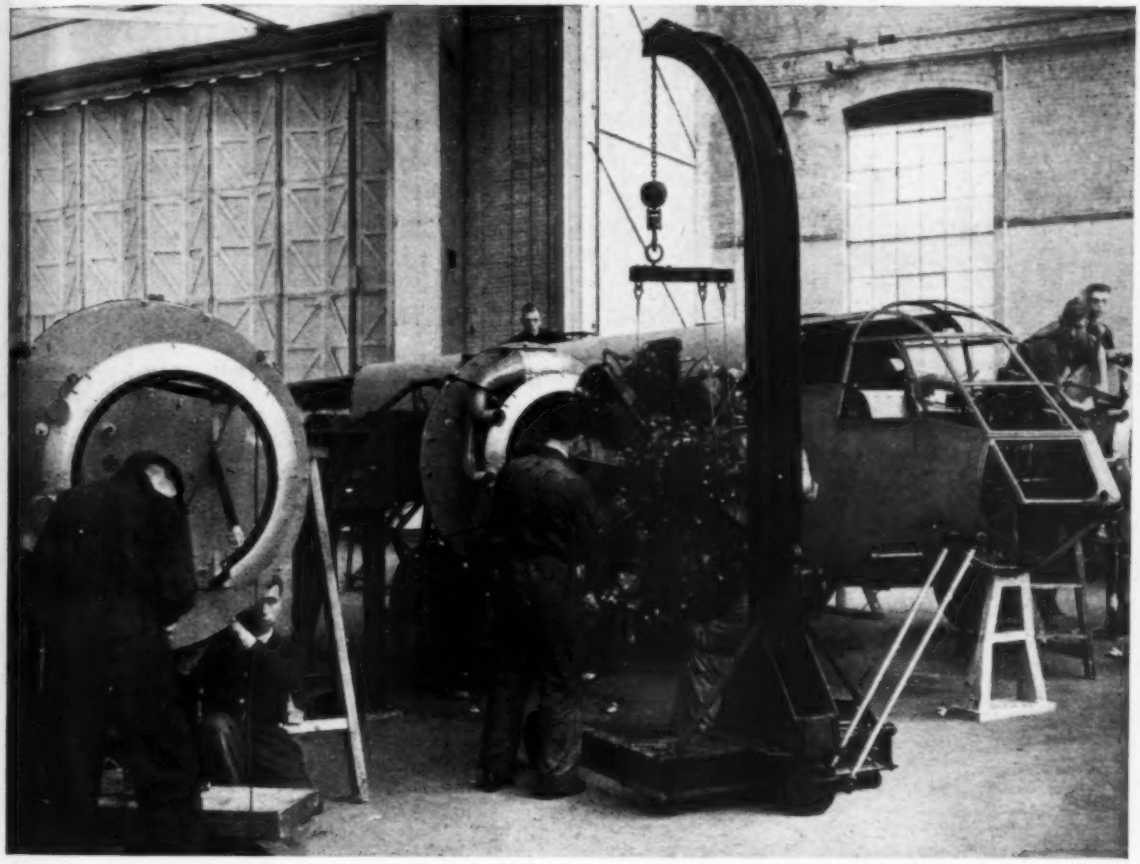


Fig. 4.—A special crane brings the Mercury VIII engine up to the mounting. Note the pipes for taking air through the oil cooler.

trols, engine controls, dashboard and instrument mountings, and so forth, and finally finishes at the top of the line, fully equipped and ready for passing forward to the horizontal fixture assembly. The glazing of the windows is not carried out at this stage, as there would be risk of damage, but is left until the final erection.

A centre-section in its special erection jig is shown in Fig. 3. The front centre-section spar can be seen, with one engine and one engine mounting in place (note the fireproof bulkhead), and the rear fuselage portion is attached and visible beyond the centre-section. The jig is waiting to receive the front fuselage portion, the attachment of which forms the next stage. While this operation is in progress the fairings for engine mountings and nacelles are installed, together with the undercarriage units.

Fig. 4 shows the front and rear fuselage portions mounted on the centre-section in the special horizontal jig. One of the Bristol Mercury VIII engines is on the special crane, ready to be offered up into position on its mounting. In this photograph, by the way, the special method of conveying air through the oil cooler should be noted.

The next operation is the fitting of the exhaust collector ring. Fig. 5 illustrates the care taken to ensure that the stub pipes with their spherical seatings are correctly fitted to

Fig. 5.—Cleaning the stub pipes before assembly on the exhaust ring collector.

Fig. 6.—Nearly ready to "stand on their own legs." A row of Blenheims in an advanced stage of assembly, showing the fitting of engines and controls.

obtain the required freedom of movement so that no undue strain is imposed on the engine when the installation is completed. The exhaust ring forms the nose portion of the special engine cowling and is supported on a tubular structure attached direct to the engine.

Fig. 6 shows the next stage, which consists in completing the fitting of all accessories for the power units. The oil tank can be seen in position in the engine nacelle, and the work of fitting the adjustable gill cowling is in progress. During this stage of operations are coupled up all the engine controls, fuel, oil and hydraulic systems and the electrical wiring between the pilot's cockpit and the engine stations. The fillets at the junction of wing and fuselage are also fitted at this stage.

While the work described above is going on in one part of the shops the tail group is being erected on a special stand elsewhere (Fig. 7). In the photograph a stern frame is seen on one stand, ready to receive the various components, and on another the whole group, including tail wheel, is nearing completion. When the tail group is finished it is transported to the allotted assembly unit and attached to the aft end of the rear fuselage portion.

This has been done in the stage illustrated in Fig. 8, which shows main component assemblies on the horizontal jig fixture. The main component assemblies are now complete and ready for removal from the jigs. It will be noted (in the foreground) that the shell of a rear fuselage is interposed between pairs of completed units, ready for use on the next assembly

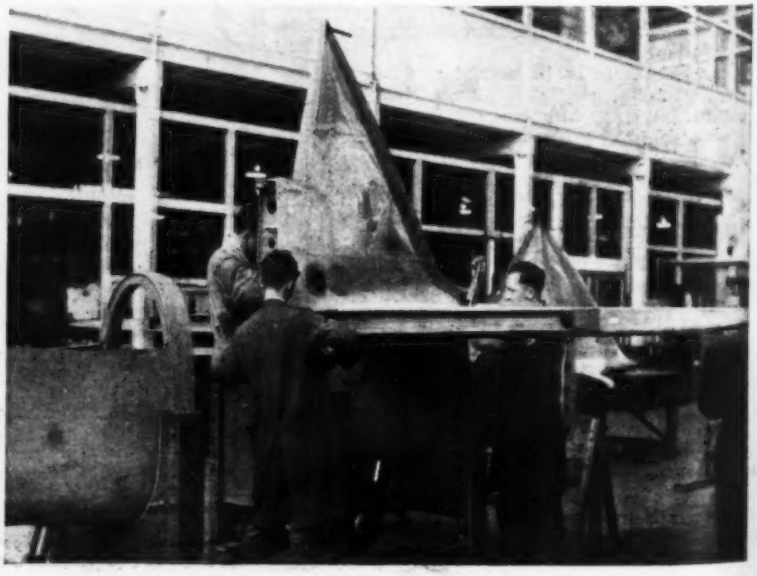


Fig. 7.—Assembling the tail unit.

Fig. 8. — Quantity production. Bristol Blenheim medium bombers on the line. They are being delivered to the R.A.F. and to several foreign governments.

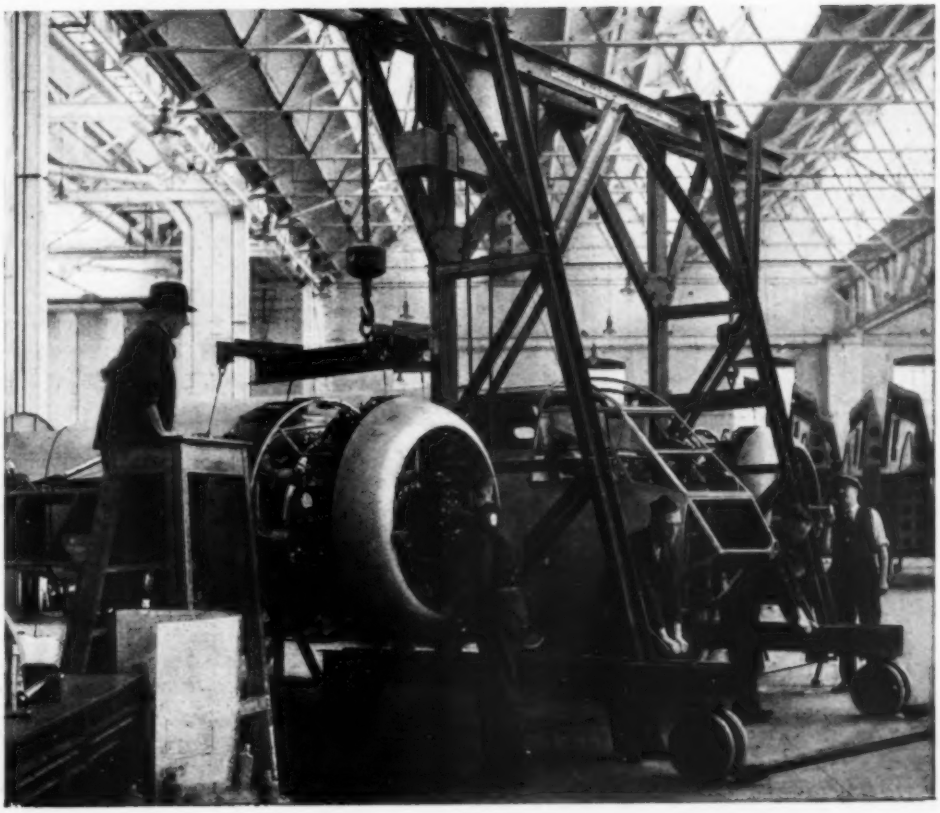


Fig. 9.—A special double - lifting crane is used for removing the main component assembly from its jig and transporting it to another station in the erecting hall.

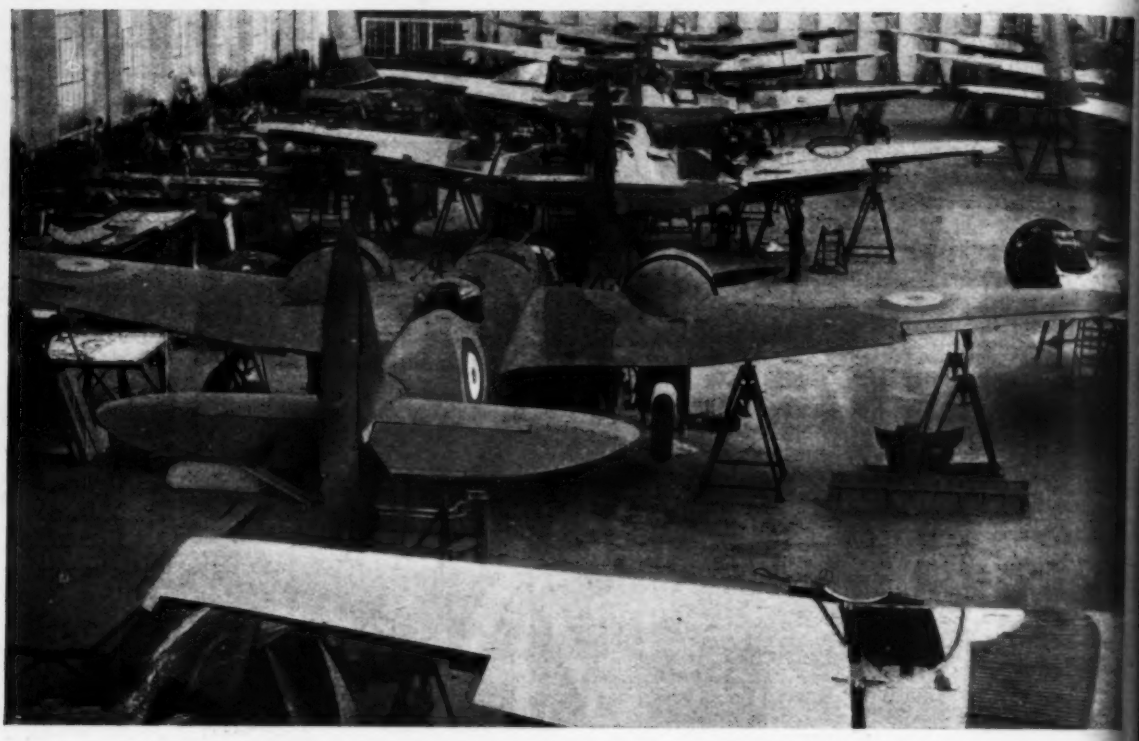


Fig. 10.—The final erection stage. Fitting wings, tanks, control surfaces, etc.

group, while the new centre-sections are waiting in racks.

The main component assembly is removed from the horizontal jig fixtures by a double-lifting crane (Fig. 9).

During the final erection stage (Fig. 10) all outstanding work is completed. The glazing and fitting of all windows in the fuselage front portion is carried out; the turret in the rear fuselage portion is fitted in place, and mechanism for operating it is finally installed and checked for correct functioning. The outer wing portions are offered-up into position on trestles and the attachments made to the centre-section. Control surfaces are next fitted and their controls coupled-up. All engine nacelle fairings are assembled on to the structure provided, and the airscrews are fitted. Instrument installation is completed and all points coupled up in the electrical and wireless systems. Lastly, internally stowed fuel tanks are secured in position in the centre-section wing and fuel pipes are coupled up to their tanks.

SOME FIRMS CONCERNED IN BLENHEIM PRODUCTION

Works Equipment.—Aerograph Co. (paint spraying), J. Archdale & Co. (drilling and milling machines), Brayshaw Furnaces & Tools, Ltd. (heat-treatment furnaces), Broom & Wade, Ltd. (pneumatic tools), H. W. Ward & Co. (capstan lathes), A. C. Wickman, Ltd. (presses), Consolidated Pneumatic Tool Co. (riveters), Chas. Churchill & Co. (milling and grinding machines), E. H. Jones, Ltd. (machine tools), W. Canning & Co. (plating plant), Alfred Herbert, Ltd. (lathes), J. Parkinson & Son (milling machines), G. Kendrick (tinsmiths' machines), F. Pollard & Co. (drilling machines), Taylor, Taylor & Hobson, Ltd. (engraving machines).

Steel.—Thomas Firth & John Brown, Ltd.; Firth Vickers & Co.; English Steel Corporation; Samuel Osborn & Co.; Arthur Lee & Sons, Ltd.; J. J. Habershon & Co.

Brass and Phosphor Bronze.—McKechnie Bros., Ltd.; I.C.I. Metals, Ltd.; Thos. Bolton & Co.

Light Alloys.—James Booth & Co. (1915), Ltd.; Northern Aluminium Co.; Reynolds Tube, Ltd.; High Duty Alloys, Ltd.

Tubes.—Accles & Pollock, Ltd.; Reynolds Tube, Ltd.; James Booth & Co. (1915), Ltd.; British Aluminium Co., Ltd.; Tungum Sales Co., Ltd.

Castings and Stampings.—Dcritend Stamping Co., Ltd.; Birmingham Aluminium Co.; Light Alloy, Ltd.; Brecknell, Munro & Rogers, Ltd.; Magnesium Castings, Ltd.; Hughes Johnson Stampings; Vaughan Bros.; Thos. Smith & Sons, Ltd.; Thos. Smith Stamping, Ltd.

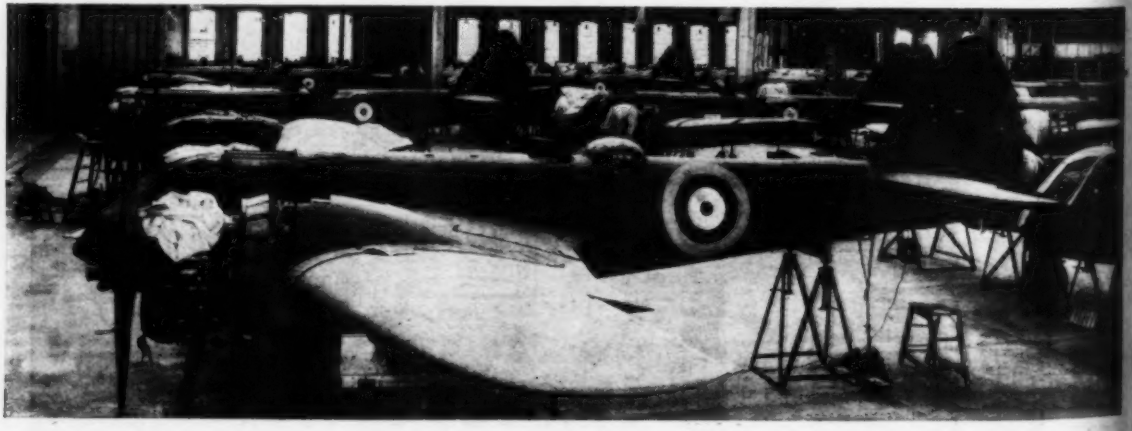


Fig. 11.—Ready for final inspection. Blenheims about to be passed to the production flight shed for flying tests before delivery.